INPUT®

IT Intelligence Services

1881 Landings Drive
Mountain View, CA 94043-0848
Tel. (415) 961-3300
Personal Office Fax (415) 965-9103
Personal Home Fax (415) 854-0107

From the office of
Peter A. Cunningham
President

FAX TRANSMITTAL FORM

Date: 12/7/93

To: Name: Tom O'F

Tel./Location:

Co.:

Fax No:

From: Name: Pete C

Subject: TRW / X

Confidential: Y / N
Urgent: Y / N

Page: 1 of 11

File: Chron
Contact
Other:

TRW / See attached notes

1. Work. You need to be more proactive with them
2. Quality. Also comments on what you sent them.

Pete.

P.S. Call me to discuss after you've reviewed with Sugar (I have called him - he will be back Friday).

P.

X / See attached - looks good!

Pete

ADM 341/03 8/93

Tom

No! No! You must follow up with Sugar see attached.
Peter

Dec 3

To: PAC cc. Bob G

Fm: TOF

Re: TRW Status

At TRW's request (and for a $3,500 fee) I attended their Information Technology Symposium on Oct 20 and 21 where people from different parts of TRW gave short summaries of their capabilities. Attached is the program list and my report to Ron Sugar. This should be self-explanatory.

Bob and I gave a joint presentation on Oct 22, basically a customized client presentation; agenda attached. Members of the task force PAC and I met with were there as well as about a dozen other planners and managers. It was quite interactive and seemed to go well.

As previously reported, I had a side conversation with Phil Papaccio about Cap Gemini (with whom they have been having conversations). I expanded on our public comments and said that Cap Gemini had a problem in bringing together their high level consultants they had acquired (United Research and MAC Group) with their essentially body shop CGA. [Confirmed subsequently from other sources.] Cap Gemini, at least in the U.S., does not really have SI capabilities, in the way the INPUT and TRW would define them. Phil found this analysis useful.

Bob and I agreed that he would be the point of followup contact with TRW on both the program and, for the time being, the custom status.

As a result of my time with TRW I have the following observations:

- They aren't at all sure where they are going (said by several people to me)
- They are quite unsure as to the best analytic/planning way to form their options; both their own sketch of what they wanted and our proposal have not seemed to trigger "must do" responses.
- TRW may view INPUT as market analysts rather than strategic thinkers; this appears to be as much an image issue as a substance issue

They have spent a total of $11,500 on work to date; our proposal quoted $72,000 (summary attached).

So! you must change that image. Only way is to be pro-active! Peter

INPUT IT Intelligence Services

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Fax (415) 961-3966

November 4, 1993

Dr. Ronald Sugar
TRW
Space Park
Redondo Beach, CA 90278

Via fax 310-813-2412

Tom

Dear Ron:

Attached is INPUT's preliminary assessment of the technologies which were presented at the Technology Forum. Obviously, there is only so far that this sort of analysis can go, given the limitations in time and format.

By the way, I thought that the presentations and presenters were excellent overall.

As I discussed with several people from TRW at the time, this is one case where there undoubtedly would be synergies if some of the technology groups worked more closely together. But I understand that within the historic TRW culture this is sometimes easier said than done,

If you have any questions or comments, please call me. I will be back in my own office on Monday (201-801-0050).

Sincerely,

Thomas O'Flaherty
Vice President

You need to make specific follow-up proposal - should have been automatic! - based on the work you have done

Your original proposal is out-of-date

Please follow-up with Sugar
I'm calling him, too!

Linkage to Other TRW Technologies

While there was overlap between many of the technologies (e.g., across imaging), some links appear tighter than others. These are noted in the exhibit.

Where the L—— are recommendation for what to do?

Tom,

All your work here is passive, analytical (just as you stated their image of INPUT to be). YOU must make it more active — take charge! you know what's to be done. A McKinsey or Booz Allen or AC consultant would never leave this as it is!

Lousy layout

Preliminary Assessment of TRW Technologies

Factor	1. Automated ID Systems	2. EDI	3. I-CASE Meth.	4. C/S Arch.	5. Text Mgt.	6. OA	7. Automotive Info. Sys.
Overall Technology							
• General Capability		X	X	X		X	
• Leading Edge	X						X
• Unique					X		
Market Issues							
• Commercial Opportunity	M	N/A	N/A	N/A	M	L	H
• Critical Time Window	No	No	No	Yes	No	No	Yes
• Level of Ongoing Investment	?	M	M	M/H	M/H	L	H
• Level of Risk	M	N/A	N/A	N/A	M	N/A	M
• Resource Constraint	No	Yes	Yes	Yes	Yes	Yes	?
Delivery Alternatives							
• Service					X		
• Know-how		X	X	X	X		
• Product					X		X
• SI	X	X		X	X	X	X
Technology							
• Imaging	X				X	X	
• Identification	X				X	X	
• Data/Text Mgt					X	X	
• Communications		X		X		X	X
• Other			X				X
Linkage to other TRW Technologies (Presentation #)				6	6,8	5,8	8

YTR-1

Where is the legend?

What does all this mean?

INPUT

PRELIMINARY ASSESSMENT OF TRW TECHNOLOGY

I. BACKGROUND

INPUT attended TRW's technology overview presentation on October 21 and 23, 1993 where 21 presentations were made on technology capabilities.

This report summarizes INPUT's initial assessments of these technologies. INPUT's assessments are based on the following:

- Statements, data and analysis presented by TRW.
- Prior research conducted by INPUT in these product and market areas
- INPUT staff knowledge in these technology and market areas

Each technology area was evaluated against the factors described in section II the results of the assessments are shown in the attached series of exhibits.

The evaluations were based on INPUT's current understanding. In some cases, INPUT would require additional information for a complete assessment (these are noted by "?" in the appropriate cell). However, in most cases INPUT has had enough information to provide at least a preliminary assessment.

II. ASSESSMENT CRITERIA

The following factors were used to assess the technologies presented. These assessments are all necessarily tentative and include many implicit assumptions. More complete assessments would be dependent on

- A deeper understanding of the offerings along with other supporting or associated technologies.
- In some cases, additional market research.

I propose this for key areas!!

Examples of the problem I mentioned - just one page
P.

Delivery Alternatives

Based on the discussions at the presentation, the technologies can be delivered as

? o A service (e.g., Odyssey)

o Know-how (i.e, via consulting)

o One or more products (as in text management)

o Systems integration (or as a component of SI)

Delivering know-how is often subject to resource (people) bottlenecks. TRW is probably not well-positioned to market and service some products (e.g., software. SI-based services will usually provide the largest amount of leverage. Since many of the SI-opportunities will be in the commercial market, TRW may have to partner, ~~at least~~ initially, with established SI firms to be the most ? effective in commercial markets.

Technology

In the course of the analysis, the technologies presented were noted; these weere classified into the following categories:

o Imaging

o Identification

o Data/test management

o Communications

o Other (four technologies in whole or part)

Imaging, data/text management and communications are already complementary technologies and will, arguably, being even more closely related in the future.

It became clear that within particular technology areas that there was considerable overlap in activities. INPUT believes that at least some of the acitivities in, for example, imaging and text/data management, would benefit be being much more closely coordinated and, possibly, combined. It is not possible on the information provided to make any stronger statements now in this regard.

"weasel" words

out of date.

VI. FEE

The professional fee for the study will be $72,000. One-half of this fee ($36,000) is due and payable upon authorization. The remainder of the professional fee plus out-of-pocket expenses is due upon the submission of the final report or presentation. Out-of-pocket expenses primarily include travel, telephone, and report preparation will be charged at cost.

At TRW's request, the work has been further broken out into four functional units and the professional fee priced accordingly. The sum of the individual units is more than the professional fee for the entire project because of efficiencies when the project is planned and perform simultaneously. Because of the fast track nature of the assignment, INPUT does not believe that it is practical to perform functional units of work sequentially.

	Function Unit of Work		Associated Professional Fee
A.	Market overview preparation and presentation	✓	$8,000
B.	Analysis of internal capabilities and expansion to adjacent markets	rough done	$21,000
C.	In-depth competitive analysis of eight competitors	? not relevant now	$25,000
D.	Scenario analysis and final report		$25,000

Note: If "D" is elected without "B" or "C", INPUT may choose to further define the areas of "Scope" which it will be responsible for.

The above figures are for the professional fee only. Reasonable documented out-of-pocket expenses will be charged for work in each functional unit.

TRW may authorize the study by signing below.

INPUT®

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#351

FAX TRANSMITTAL FORM

Confidential: Y / N
Urgent: Y / N

Date: 10/5

To: Name: Tom O'Flaherty

Tel./Location: 206-644-2500

Co.: Embassy Suites

Fax No: 206-644-2091

From: Name: Joanne Boyle

Subject:

Page: 1 of ~~3~~ 4

File: Chron

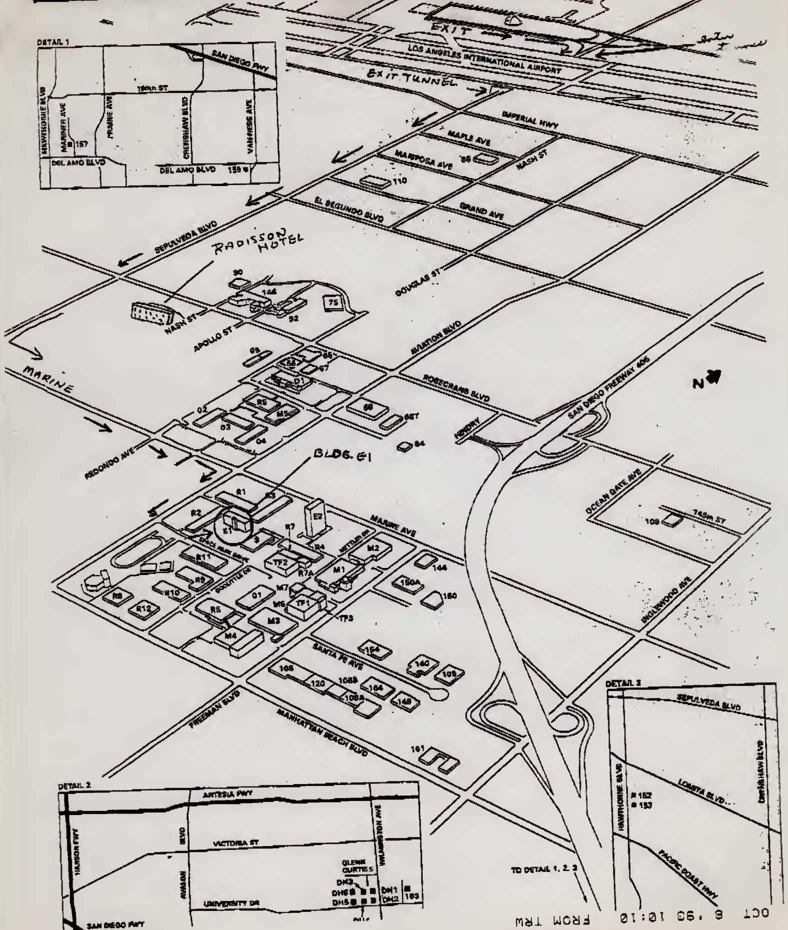
Contact

Other:

Need anything else?

FYI – current ticket is probably refundable at airport (ie. can be used to pay for new tix – $858).

L.A. Local Area Building Map



```
                                                                 ATE: 05 OCT 93
                                   ITINERARY                     PAGE: 01
SALES PERSON: 11                               SEKHIL
CUSTOMER NBR: 011018

      TO: INPUT
          400 FRANK BURR BLVD.
          TEANECK NJ 07666


FOR: OFLAHERTY/THOMAS MR


05 OCT 93  -  TUESDAY
  AIR   UNITED AIRLINES      FLT:1175    ECONOMY
        LV SEATTLE TACOMA                  354P          EQP: 737-300
        AR LOS ANGELES                     629P          NON-STOP
        OFLAHERTY/THOMA                 UA-83274724
  CAR   LOS ANGELES                 AVIS RENT A CAR       1-COMPACT CAR AUTO AC
        PICK UP-1829
        RETURN-06OCT/1140
        RATE IS GUARANTEED
        DAILY RATE-USD39.95          UNLIMITED MILEAGE     .00 PER MI/KM
        EXTRA HOUR-13.32
        CONFIRMATION NUMBER          28985956US6
  HOTEL RADISSON HOTELS                    1 NIGHT   OUT-06OCT
        RD MANHATTAN BEACH                 1 ROOM    STANDARD 1 KING BED
        1400 PARKVIEW AVE                  RATE-139.00USD PER NIGHT
        MANHATTAN BEACH CA 90266
        FONE 310-546-7511                  CANCEL 6PM DAY OF ARRIVAL
                                           GUARANTEED LATE ARRIVAL
                                           CONFIRMATION R7523243


06 OCT 93  -  WEDNESDAY
  AIR   UNITED AIRLINES      FLT:6        ECONOMY        LUNCH
        LV LOS ANGELES                    1140A          EQP: BOEING 767
        AR NEW YORK JFK                    804P          NON-STOP
        OFLAHERTY/THOMA                 UA-83274724

  CONFIRMED CCAR 2DR PONTIAC SUNBIRD OR SIMILAR
  HOTEL GUARANTEED WITH ME O FLAGHERTY S AX CREDIT CARD
  THANK YOU FOR CALLING GLENPOINTE TRAVEL
```

215 - United

245 - | AS

210 Delta

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Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: 10/15

Confidential: Y / N
Urgent: [✓ Y] / N

To: Name: Bob Goodwin (Visitor)
Tel./Location:
Co.:
Fax No:

Page: 1 of 4

File: Chron
Contact
Other:

From: Name: TUR
Subject: TRW Presentation

- Attached is "Outline" (which I got from them)
- I will be there Wed/Thurs listening to & assessing presentations on their technical capabilities (for applying the capabilities to "the market")
- So, whatever time you arrive — I'll be there
- We start at 8 & end at ≈3 (My last plane is 4^{30})
- Attached is a crude breakdown of responsibilities. I figure we have 5½ hrs of actual face time & 4 hrs of us talking to them from prepared stuff

- What is the assessment of TRW's strategic alternatives? These include
  - "Business as usual" (including changes now being considered)
  - Mobilizing and applying internal capabilities in a more intense and directed manner; applying capabilities from one part of the business to another part.
  - Partnering; acquisition (i.e., the spectrum of external relationships)
  - Divestiture

  Assessments will include, but not be limited to,
  - Risks and opportunities
  - Organizational impact on and "cultural fit" with TRW
  - Growth and profitability scenarios
  - Impact on TRW overall

- What are implementation issues and alternatives for different strategies?

III. METHODOLOGY AND CONDUCT OF THE WORK

INPUT views the study as being an interactive one in which both INPUT and TRW will contribute data, knowledge, and analysis. INPUT's primary role will be to supply market and competitive data and analysis; however, INPUT believes that it will also be able to make important contributions concerning TRW's offerings and capabilities. INPUT believes that the study's overall findings and recommendations will be a joint product of INPUT and TRW efforts.

At the completion of the work, all the issues identified under "Scope", above, will have been addressed.

The study will be kicked off by an interactive presentation between INPUT and TRW in Redondo Beach. [Note: INPUT is assuming that all meetings and worksessions will take place at a TRW location in Southern California.] The presentation will include

- An overview of the U.S. information services market. → Del modes → Industries
- Special focus on markets in which TRW is now currently active (i.e., SI, credit data bases, financial services markets)
- The relationship of SI and outsourcing
- Communications as a separate market and as a part of information services delivery modes
- Other topics as agreed to

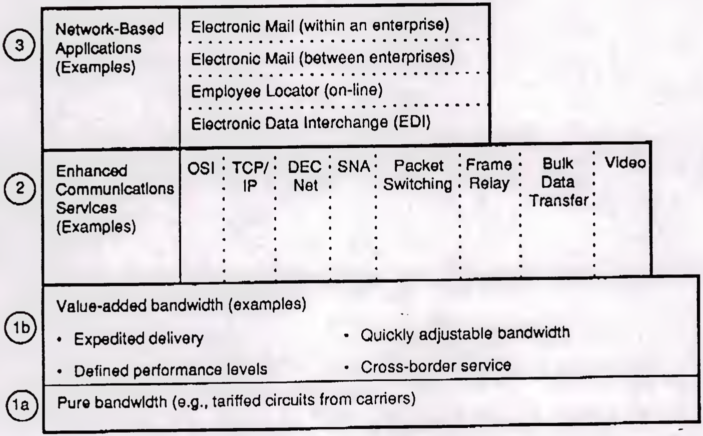
TRW Presentation

Content	INPUT	Time (
• MAPS IS overview	Bob	1½
- Credit DB	Tom or Bob	1/4
- Finl Svcs	Tom or Bob	1/4
• SJ (+ comm))	Tom	3/4
• Role of technology	Tom	1/4
• "Communications" →	Tom ?	1 (?)
- Hierarchy (attached)		
- Value-added		
- Multimedia		
- Elec Commerce		

(Very rough)

~~EXHIBIT-1~~

Levels of Communication Services



③ Network-Based Applications (Examples)

- Electronic Mail (within an enterprise)
- Electronic Mail (between enterprises)
- Employee Locator (on-line)
- Electronic Data Interchange (EDI)

② Enhanced Communications Services (Examples)

- OSI
- TCP/IP
- DEC Net
- SNA
- Packet Switching
- Frame Relay
- Bulk Data Transfer
- Video

(1b) Value-added bandwidth (examples)

- Expedited delivery
- Defined performance levels
- Quickly adjustable bandwidth
- Cross-border service

(1a) Pure bandwidth (e.g., tariffed circuits from carriers)

YNDC2

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FAX TRANSMITTAL FORM

Date: 10/15
Confidential: Y / N
Urgent: [✓ Y] / N

To: Name: Andrea
Tel./Location:
Co.:
Fax No:

Page: 1 of 2

File: Chron
Contact
Other:

From: Name: TA

Subject:

If you can find the original of the attached, could you fax me a copy on the "very fine" speed. We don't have a really good copy left

(This was done about Feb/Mar 92)

Thanks

EXHIBIT-1

Levels of Communication Services

③	Network-Based Applications (Examples)	Electronic Mail (within an enterprise) Electronic Mail (between enterprises) Employee Locator (on-line) Electronic Data Interchange (EDI)
②	Enhanced Communications Services (Examples)	OSI TCP/IP DEC Net SNA Packet Switching Frame Relay Bulk Data Transfer Video
(1b)	Value-added bandwidth (examples)	• Expedited delivery • Quickly adjustable bandwidth • Defined performance levels • Cross-border service
(1a)	Pure bandwidth (e.g., tariffed circuits from carriers)	

YNDC2

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Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: Oct 15

To: Name: Steve Patz

Tel./Location: TRW - 310-812-9603

Co.:

Fax No: 310- 813-2412

From: Name: Tom O'Flaherty

Subject: Symposium

Confidential: Y / N
Urgent: [✓ Y] / N

Page: 1 of 3

File: Chron
Contact
Other:

ADM 341/05 8/93

TRW

One Space Park, R3/1028
Redondo Beach, CA 90278
310. 812. 9603

FACSIMILE COVER SHEET

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To: Tom O'Flaherty
Phone:
Fax:

From: Linda
Phone:
Contact: 310. 812. 9603

Total number of pages (including lead sheet) -

Short Message:

October 14

LAX to Space Park

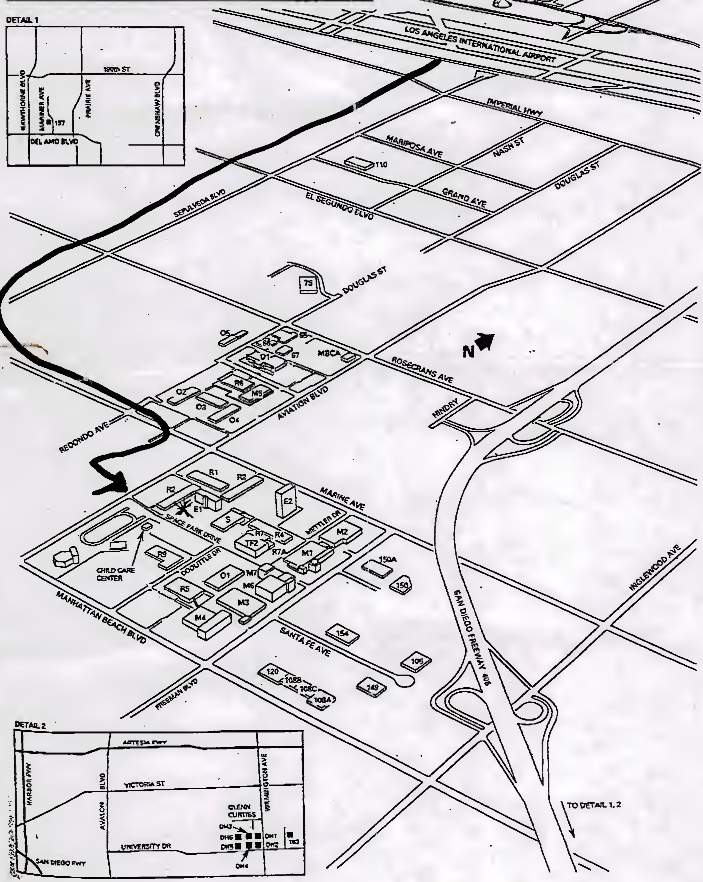
South on Sepulveda Blvd. to Marine Ave.
Left on Marine Ave. to Aviation Blvd.
Right on Aviation Blvd. to Space Park Drive
Left on Space Park Drive - Go to Bldg. E1

If you have any questions, please call.

Linda
310.812.9603

Meet in E-1 at ≈ 7^{45} to get badges
(Conducted by Linda [812-9603]) to R-3

TRW Locations - Space Park



INPUT®
IT Intelligence Services

1953 Gallows Road, Ste. 560
Vienna, VA 22182
Tel. (703) 847-6870
Fax (703) 847-6872

FAX TRANSMITTAL FORM

Date: 10/13/93

Confidential: [✓ Y]/N
Urgent: [✓ Y]/N

To: Name: TOM O'FLAHERTY

Tel./Location:

Co.:

Page: 1 of 8

Fax No:

File: Chron
Contact
Other:

From: Name: PETE C

Subject: TRW PROPOSAL

Tom

Comments

Generally minimize staff identification in all projects

Otherwise looks good.

Are you sure there is enough in the firm-price viewpoint

Th

Tom —
Do you want to
mention phase 1, 2 in
cover letter?

October 12, 1993

Mr. Ronald Sugar
Vice President-Group Development
TRW Space and Electronics Group
One Space Park
Redondo Beach, CA 90278

Dear Ron:

INPUT is pleased to submit the attached proposal for helping you assess your opportunities in the information services industry.

INPUT has had a long and successful record of evaluating and advising firms on their position and opportunities in the information systems business. Clients with such relationships have included IBM, Andersen Consulting, McKinsey & Co., Boeing Computer Services, McDonnell Douglas, Ford Aerospace, General Motors/EDS Citicorp, Bank of America, and Continental Insurance.

INPUT has in-depth experience in all the areas of investigation and will be able to perform a comprehensive assessment for TRW. We will treat this as a confidential, priority effort and will assign a small cadre of senior staff to this study.

If you have any questions, please give one of us a call. We look forward to working with you and others at TRW, and believe that we can be of great assistance in this effort.

Sincerely,

Peter A. Cunningham
President

Thomas O'Flaherty
Vice President

Attachment

Proposal

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

Submitted to

TRW

nice!

October 12, 1993

Submitted by

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

I. OBJECTIVES

- Determine how to maximize value to TRW of the current information services business
- Determine alternative scenarios for TRW in the information services industry
- Recommend near and long term overall strategies for TRW in the information services industry

II. SCOPE

phases

The study has two ~~elements~~:

1. Market assessment and strategy development
2. Implementation of the strategy

~~Phase 1~~

phase.

This proposal addresses the first ~~element, market assessment and strategy development.~~ Implementation will in large part depend on the results of the ~~initial phase 1~~ phase 1

Phase 1

The issues to be addressed in ~~the initial~~ phase, ~~market assessment and strategy development,~~ include ~~the following~~:

- What are market conditions in TRW's ~~current~~ information service markets? This includes
  - Size
  - Growth
  - Customer characteristics and requirements
  - Technology requirements (e.g., converging of computers and communications, client/server)
  - Market trends

  Markets assessed will include: Credit services, other financial services, systems integration and other markets specified by TRW.

Judgemental. not sure this is relevant! suggest change to.

- How ~~well is TRW addressing its current target information service markets? What additional internal resources and capabilities~~ can TRW ~~mobilize to~~ improve its position in current markets? What external capabilities does it require? ("Capabilities" include, but are not limited to, such factors as technology, applications, market share and position, staff expertise, customer perceptions, sales and marketing.)

- What "adjacent" markets should TRW consider addressing? These can include:

  - New/expanded offerings to current customer sets.
  - Modifications of current offerings/capabilities to new customer sets.
  - To what extent will specific capabilities such as communications expertise be a factor?

- What are the characteristics of these "adjacent" markets in terms of

  - Size
  - Growth
  - Customer characteristics and requirements
  - Technology requirements
  - Market trends

- What is TRW's competitive position in its current and potential markets in terms of

  - TRW's market share
  - TRW's growth vs. market growth
  - TRW's capabilities vs. market requirements
  - TRW's Capabilities vs. those of major competitors

- What are the profiles of major competitors? Profiles will include (but are not limited to):

  - Target markets, market share and growth
  - Capabilities (technical, applications, etc.)
  - Synergies (or lack) between major business components
  - Strengths and weaknesses
  - Strategic direction

  Competitors to be profiled fall into at least two groups:

  - Companies that are similar to TRW (e.g., Hughes, Martin Marietta, Lockheed, Rockwell, McDonnell Douglas). Note: It may be important to understand the strategies and motivations of companies that were formerly in the information services business.
  - Companies that compete with TRW in an information services market (e.g., D&B, Equifax, CSC, EDS, Black & Decker)

- What is the assessment of TRW's strategic alternatives? These include
  - "Business as usual" (including changes now being considered)
  - Mobilizing and applying internal capabilities in a more intense and directed manner; applying capabilities from one part of the business to another part.
  - Partnering; acquisition (i.e., the spectrum of external relationships)
  - Divestiture

  Assessments will include, but not be limited to,

  - Risks and opportunities
  - Organizational impact on and "cultural fit" with TRW
  - Growth and profitability scenarios
  - Impact on TRW overall

- What are implementation issues and alternatives for different strategies?

PHASE 2. —— brief description of how INPUT can help

III. METHODOLOGY AND CONDUCT OF THE WORK

INPUT views the study as being an interactive one in which both INPUT and TRW will contribute data, knowledge, and analysis. INPUT's primary role will be to supply market and competitive data and analysis; however, INPUT believes that it will also be able to make important contributions concerning TRW's offerings and capabilities. INPUT believes that the study's overall findings and recommendations will be a joint product of INPUT and TRW efforts.

At the completion of the work, all the issues identified under "Scope", above, will have been addressed.

The study will be kicked off by an interactive presentation between INPUT and TRW in Redondo Beach. [Note: INPUT is assuming that all meetings and worksessions will take place at a TRW location in Southern California.] The presentation will include

- ~~An overview of the U.S. information services market.~~
- Special focus on markets in which TRW is now currently active (i.e., SI, credit data bases, financial services markets)
- ~~The relationship of SI and outsourcing~~
- Communications as a separate market and as a part of the information services ~~delivery~~ industry ~~modes~~
- Success factors for large companies expanding into information service.
- Other topics as agreed to

A second worksession will be devoted to the following:

- TRW will share any internal analyses which have been prepared on how well TRW has been addressing current markets. TRW and/or INPUT may prepare additional analyses on this issue.
- TRW and INPUT will initially identify internal capabilities which appear to have additional scope for leverage and/or can be applied to different markets.
  - TRW may perform additional work on identifying such capabilities.
  - INPUT will begin work on assessing the market impact of such successful leveraging.
- TRW and INPUT will make a first cut of the "adjacent markets" which appear to offer the most opportunity.
- INPUT will present an outline of the categories to be included in competitors' profiles. INPUT and TRW will agree on companies to be profiled. INPUT assumes that approximately 8 companies will be profiled. TRW will share work already conducted on competitive assessments.

After this worksession, INPUT will perform additional analysis on the following:

- Expansion/refinement of analysis of market conditions on current markets.
- An assessment of the impact of applying internal capabilities to the information service business (both to the current business as well as to new business areas)
- An analysis of "adjacent markets"

In addition, INPUT will ~~begin work on~~ prepare competitor profiles and assessments based on its data base of information.

A third worksession will be held approximately two weeks after the second worksession. This worksession will include the following:

- Supplying and discussing the analysis of market conditions.
- A first cut analysis and discussion of the effect of "mobilizing" TRW's internal capabilities.
- An overview discussion on the competitive environment, especially the long term strategies of competitors.

At the conclusion of the third worksession, there will exist in outline the following foundation for analysis:

- Market opportunities and TRW capabilities
- Gaps in TRW capabilities: Preliminary assessment of alternatives for filling these gaps.
- TRW competitive position (with and without gaps being filled)
- Strategic alternatives

INPUT and TRW will agree on the division of tasks to develop strategic scenarios. At the fourth worksession the strategic scenarios will reviewed and recommendations drafted. One part of the recommendations will be an implementation plan.

The output of this work will be a presentation for senior TRW management and/or a formal report. INPUT assumes that INPUT will have primary responsibility for preparing materials on the market and competition.

V. QUALIFICATIONS

INPUT's subscription program work on information service markets and vendors gives INPUT an unparalleled foundation on which to build its market analysis and recommendations. (Information on applicable programs has already been supplied to TRW.)

In addition, INPUT has provided targeted advice on strategic choices in information services to a variety of firms including IBM, Andersen Consulting, McKinsey & Co., Boeing Computer Services, McDonnell Douglas, Ford Aerospace, General Motors/EDS, Citicorp, Bank of America and Continental Insurance.

A number of INPUT's strategic consulting assignments have involved technology capability issues. Appendix A contains examples of recent studies involving communications-oriented capabilities and offerings.

The study will be directed by Thomas O'Flaherty, Vice President, who has directed over 200 custom research and consulting assignments for a variety of major firms. ~~Other members of the project team will include:~~

- ~~Peter Cunningham, President~~
- ~~Laura Haggerty, Director, Vendor~~ Analysis Program
- ~~John McGann, Principal Consultant~~
- ~~Steven Korn, Director, Interactive Communications Program~~

~~Project staff biographies are in Appendix B.~~

no need to give names.

You could say I will participate

generally don't do

Rest is OK

Pete Cunn— will participate in the study as necessary, particularly the presentation of findings of the study

URGENT

INPUT®

IT Intelligence Services

1881 Landings Drive
Mountain View, CA 94043-0848
Tel. (415) 961-3300
Personal Office Fax (415) 965-9103
Personal Home Fax (415) 854-0107

From the office of
Peter A. Cunningham
President

FAX TRANSMITTAL FORM

Case studies
Telecomm

Date: 10/6/93
To: Name: Tom O'Flaherty
Tel./Location:
Co.:
Fax No:
From: Name: Pete C.
Subject: TRW Proposal

Confidential: Y / N
Urgent: Y / N

Page: 1 of 3

File: Chron
Contact
Other:

Tom

Attached is contact report - there were a couple of things that came up after you left that are important.

Call me to review prop. I'm leaving for Boston about noon: will be there all day Friday. Will be in ~~Phi.~~ Minn Monday and NY Tuesday. *Can we get together Tue pm?*

Plan to go to Wash on Wed

Then to Tokyo from NY on Th. evening.

* Need to review BPR data with you.

* How is Steve Kern doing? - perhaps he can work on-site at TRW - he knows communications.

* When do we plan to submit proposal?

* When is your IBM meeting with JP, Brian et al. I hope its not next Wed!!!

Hope X went well - let's review.

Thanks

Pete

ADM 341/03 8/93

URGENT

INPUT

CONFIDENTIAL—Property of INPUT

CONTACT REPORT

Contact Date: 10 / 6 / 93
Date Written: 10 / 6 / 93

INPUT Staff: Init. PM Init. JOF ☐ INPUT office ☑ Client Office ☐ Other ______

Prog./Proj. ID ______

DISTRIBUTION:

Action	Info.	By When	Describe Action-F/U
Tom - V.I.P - for proposal.			
Mail list:			

TRW

TRW Systems Integration Group

E1/5070
One Space Park
Redondo Beach, CA 90278
310.812.9999
Fax 310.814.3978

Philip N. Papaccio
Vice President & Deputy
General Manager

TRW

TRW Space & Electronics Group

One Space Park
Redondo Beach, CA 90278
310.814.6446

Ronald D. Sugar
Vice President
Group Development

TRW

TRW Systems Integration Group

One Space Park
Redondo Beach, CA 90278
213.812.0017
FAX: 213.812.7147

David H. Barakat
Vice President and Manager
Global Change Initiatives

4 areas of help from INPUT
1. Help size the market - what's happening in IT.
2. What are outside companies doing
3. What should TRW strategies be
4. (LATER) What companies should they partner (acquire).

· ISS will be part of team. It is now run by Van Stelling. About $500m Sold off a lot of properties. ? what to do with it.

· Want 80/20 rule applied. Complete first phase by Christmas. Wants to make presentation on markets by end of October

· We could also help in reviewing the results of their 'asset' investigation. Also, possibly with their larger vision and strategy.

· Want to keep federal and state and local government involved. Introduced "CONCURRENT ENGINEERING" Term

· They asked us problems that similar companies had had. We identified 1. "Big dogs need big bones - so don't piddle with small things." 2. No "PORTFOLIO" approach unless you use them as kernels of investment. 3. "Analysis Paralysis" 4 Need for cultural fit!

· They can have 'patchwork quilt' of products related to customer set - automotive is like that

☑ Continued over

M&S 200.01 6/92 (R)

Update ☐ Correction ☐ Deletion ☒ Addition* Serial Number ______

2. Customer Type: ☑ Vendor ☐ Others ☐ Media ☐ User

3. Newsletters: ☐ EDI ☐ Field Service ☐ Other

4. Vendor: Vendor Type— ☐ Client ☐ Former/Report Client ☐ Prospect

- Contact Level— ☐ Executive ☐ Acquisition ☐ International ☐ Other
- If Exec. or Other Contact Level— ☐ Maintenance ☐ Equipment ☒ Communications ☐ Others ☒ Info. Svc.
- If Info. Services— ☒ Turnkey & Software ☒ Network & Processing ☒ Systems Integration ☒ Professional Svc.

5. If User: User Type— ☐ Client ☐ Former/Report Client ☐ Prospect

- Comm. Contact Level— ☐ Executive ☐ IS Mgmt. ☐ Other
- Fed. Contact Level— ☐ Executive ☐ Acquisition ☐ Prog. ☐ Manager/Technical ☐ Other
- If Fed. Executive— ☐ Info. Resource Mgr. ☐ Asst. Secretary ☐ Commander (Military) ☐ Agency Head
- If Fed. Other— ☐ Laboratory ☐ NIS ☐ Users ☐ GSA

* No names will be added without a completed change order and program manager approval.

Program Manager Authorization ______

CONTACT REPORT
Continuation

Company ______

Name ______

· Have a transportation initiative.

· After Tom left. – Ron strongly requested us to put in proposal that we would prepare case studies on companies and lessons to be learned. Example of business transformation – Harris from printing to communication.

· Particular companies to look at 1. Hughes, 2. Martin Marietta 3 Lockheed, possibly 4. Rockwell. Others might include D&B, Equifax, Eaton, Bosch. Another set (the ones above are their competitors in their current business stream) would be CSC, Black & Decker (PRC/AT), GM/EDS, McDonnell Douglas.

Ron
· Also, Ken again heavily emphasized communication as an area they want to look at.

They have a very strong information management component
go with away mgt

File

INPUT®

IT Intelligence Services

400 Frank W. Burr Blvd.
Teaneck, NJ 07666
Tel. (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: Oct 13

Confidential: Y / N
Urgent: Y / N

To: Name: Ron Sugar

Tel./Location: 310-814 6446

Co.: TRW

Page: 1 of 19

Fax No: 310-813-~~[illegible]~~ 2412

File: Chron

Contact

Other:

From: Name: Tom OFlaherty

Subject: Proposal

This incorporates the presentation activity for Friday Oct 22

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 13, 1993

Mr. Ronald Sugar
Vice President-Group Development
TRW Space and Electronics Group
One Space Park
Redondo Beach, CA 90278

Dear Ron:

INPUT is pleased to submit the attached proposal for helping you assess your opportunities in the information services industry.

INPUT has had a long and successful record of evaluating and advising firms on their position and opportunities in the information systems business. Clients with such relationships have included IBM, Andersen Consulting, McKinsey & Co., Boeing Computer Services, McDonnell Douglas, Ford Aerospace, General Motors/EDS Citicorp, Bank of America, and Continental Insurance.

INPUT has in-depth experience in all the areas of investigation and will be able to perform a comprehensive assessment for TRW. We will treat this as a confidential, priority effort and will assign a small cadre of senior staff to this study.

If you have any questions, please give one of us a call. We look forward to working with you and others at TRW, and believe that we can be of great assistance in this effort.

Sincerely,

PAC by TO
Peter A. Cunningham
President

Thomas O'Flaherty
Vice President

Attachment

Proposal

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

Submitted to

TRW

October 13, 1993

Submitted by

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

I. OBJECTIVES

- Determine how to maximize value to TRW of the current information services business
- Determine alternative scenarios for TRW in the information services industry
- Recommend near and long term overall strategies for TRW in the information services industry

II. SCOPE

The study has two elements:

- Market assessment and strategy development
- Implementation of the strategy

This proposal addresses the first element, market assessment and strategy development. Implementation will in large part depend on the results of the initial phase.

The issues to be addressed in the initial phase, market assessment and strategy development, include the following:

- What are market conditions in TRW's current information service markets? This includes
    - Size
    - Growth
    - Customer characteristics and requirements
    - Technology requirements (e.g., converging of computers and communications, client/server)
    - Market trends

  Markets assessed will include: Credit services, other financial services, systems integration and other markets specified by TRW.

- How well is TRW addressing its current target information service markets? What additional internal resources and capabilities can TRW mobilize to improve its position in current markets? What external capabilities does it require? ("Capabilities" include, but are not limited to, such factors as technology, applications, market share and position, staff expertise, customer perceptions, sales and marketing.)

- What "adjacent" markets should TRW consider addressing? These can include:
  - New/expanded offerings to current customer sets.
  - Modifications of current offerings/capabilities to new customer sets.
  - To what extent will specific capabilities such as communications expertise be a factor?

- What are the characteristics of these "adjacent" markets in terms of
  - Size
  - Growth
  - Customer characteristics and requirements
  - Technology requirements
  - Market trends

- What is TRW's competitive position in its current and potential markets in terms of
  - TRW's market share
  - TRW's growth vs. market growth
  - TRW's capabilities vs. market requirements
  - TRW's Capabilities vs. those of major competitors

- What are the profiles of major competitors? Profiles will include (but are not limited to):
  - Target markets, market share and growth
  - Capabilities (technical, applications, etc.)
  - Synergies (or lack) between major business components
  - Strengths and weaknesses
  - Strategic direction

  Competitors to be profiled fall into at least two groups:
  - Companies that are similar to TRW (e.g., Hughes, Martin Marietta, Lockheed, Rockwell, McDonnell Douglas). Note: It may be important to understand the strategies and motivations of companies that were formerly in the information services business.
  - Companies that compete with TRW in an information services market (e.g., D&B, Equifax, CSC, EDS, Black & Decker)

- What is the assessment of TRW's strategic alternatives? These include
  - "Business as usual" (including changes now being considered)
  - Mobilizing and applying internal capabilities in a more intense and directed manner; applying capabilities from one part of the business to another part.
  - Partnering; acquisition (i.e., the spectrum of external relationships)
  - Divestiture

  Assessments will include, but not be limited to,

  - Risks and opportunities
  - Organizational impact on and "cultural fit" with TRW
  - Growth and profitability scenarios
  - Impact on TRW overall

- What are implementation issues and alternatives for different strategies?

III. METHODOLOGY AND CONDUCT OF THE WORK

INPUT views the study as being an interactive one in which both INPUT and TRW will contribute data, knowledge, and analysis. INPUT's primary role will be to supply market and competitive data and analysis; however, INPUT believes that it will also be able to make important contributions concerning TRW's offerings and capabilities. INPUT believes that the study's overall findings and recommendations will be a joint product of INPUT and TRW efforts.

At the completion of the work, all the issues identified under "Scope", above, will have been addressed.

The study will be kicked off by an interactive presentation between INPUT and TRW in Redondo Beach. [Note: INPUT is assuming that all meetings and worksessions will take place at a TRW location in Southern California.] The presentation will include

- An overview of the U.S. information services market.
- Special focus on markets in which TRW is now currently active (i.e., SI, credit data bases, financial services markets)
- The relationship of SI and outsourcing
- Communications as a separate market and as a part of information services delivery modes
- Other topics as agreed to

A second worksession will be devoted to the following:

- TRW will share any internal analyses which have been prepared on how well TRW has been addressing current markets. TRW and/or INPUT may prepare additional analyses on this issue.
- TRW and INPUT will initially identify internal capabilities which appear to have additional scope for leverage and/or can be applied to different markets.
    - TRW may perform additional work on identifying such capabilities.
    - INPUT will begin work on assessing the market impact of such successful leveraging.
- TRW and INPUT will make a first cut of the "adjacent markets" which appear to offer the most opportunity.
- INPUT will present an outline of the categories to be included in competitors' profiles. INPUT and TRW will agree on companies to be profiled. INPUT assumes that approximately 8 companies will be profiled. TRW will share work already conducted on competitive assessments.

After this worksession, INPUT will perform additional analysis on the following:

- Expansion/refinement of analysis of market conditions on current markets.
- An assessment of the impact of applying internal capabilities to the information service business (both to the current business as well as to new business areas)
- An analysis of "adjacent markets"

In addition, INPUT will begin work on competitor profiles and assessments.

A third worksession will be held approximately two weeks after the second worksession. This worksession will include the following:

- Supplying and discussing the analysis of market conditions.
- A first cut analysis and discussion of the effect of "mobilizing" TRW's internal capabilities.
- An overview discussion on the competitive environment, especially the long term strategies of competitors.

At the conclusion of the third worksession, there will exist in outline the following foundation for analysis:

- Market opportunities and TRW capabilities
- Gaps in TRW capabilities: Preliminary assessment of alternatives for filling these gaps.
- TRW competitive position (with and without gaps being filled)
- Strategic alternatives

INPUT and TRW will agree on the division of tasks to develop strategic scenarios. At the fourth worksession the strategic scenarios will reviewed and recommendations drafted. One part of the recommendations will be an implementation plan.

The output of this work will be a presentation for senior TRW management and/or a formal report. INPUT assumes that INPUT will have primary responsibility for preparing materials on the market and competition.

V. QUALIFICATIONS

INPUT's subscription program work on information service markets and vendors gives INPUT an unparalleled foundation on which to build its market analysis and recommendations. (Information on applicable programs has already been supplied to TRW.)

In addition, INPUT has provided targeted advice on strategic choices in information services to a variety of firms including IBM, Andersen Consulting, McKinsey & Co., Boeing Computer Services, McDonnell Douglas, Ford Aerospace, General Motors/EDS, Citicorp, Bank of America and Continental Insurance.

A number of INPUT's strategic consulting assignments have involved technology capability issues. Appendix A contains examples of recent studies involving leveraging client capabilities and offerings.

The study will be directed by Thomas O'Flaherty, Vice President, who has directed over 200 custom research and consulting assignments for a variety of major firms. Other members of the project team will include:

- Peter Cunningham, President
- Laura Haggerty, Director, Vendor Analysis Program
- John McGann, Principal Consultant

Project staff biographies are in Appendix B.

IV. SCHEDULE

The following schedule targets completion of the analysis and recommendation tasks by mid-December. This assumes an October approval and startup.

Week	Activity
1	Initial presentation/worksession on current markets (all worksessions: Redondo Beach):
2	Second worksession: · Initial identification of internal capabilities · Identify "adjacent markets" · Identify competitors for profiling
3	INPUT conducts additional market analysis and prepares draft competitor profiles
4	Third worksession · INPUT presents additional market information · INPUT and TRW discuss impact of "mobilizing" TRW internal capabilities · Identification of preliminary gap analysis: TRW vs. market requirements; TRW vs. competitors · Identification of strategic scenarios
5	INPUT and TRW perform additional analysis on strategic scenarios (Note: schedule takes holidays into account)
6	Fourth worksession: · Strategic scenarios reviewed · Implementation plan drafted
7	Presentation/report prepared

INPUT can begin work within one week of authorization.

VI. FEE

The professional fee for the study will be $72,000. One-half of this fee ($36,000) is due and payable upon authorization. The remainder of the professional fee plus out-of-pocket expenses is due upon the submission of the final report or presentation. Out-of-pocket expenses primarily include travel, telephone, and report preparation will be charged at cost.

At TRW's request, the work has been further broken out into four functional units and the professional fee priced accordingly. The sum of the individual units is more than the professional fee for the entire project because of efficiencies when the project is planned and perform simultaneously. Because of the fast track nature of the assignment, INPUT does not believe that it is practical to perform functional units of work sequentially.

	Function Unit of Work	Associated Professional Fee
A.	Market overview preparation and presentation	$8,000
B.	Analysis of internal capabilities and expansion to adjacent markets	$21,000
C.	In-depth competitive analysis of eight competitors	$25,000
D.	Scenario analysis and final report	$25,000

Note: If "D" is elected without "B" or "C", INPUT may choose to further define the areas of "Scope" which it will be responsible for.

The above figures are for the professional fee only. Reasonable documented out-of-pocket expenses will be charged for work in each functional unit.

TRW may authorize the study by signing below.

VII. AUTHORIZATION

To authorize the project as specified, please sign and return one copy of this proposal, along with the initial fee. Upon acceptance by INPUT, a countersigned copy of the proposal will be returned to TRW.

AUTHORIZED BY:	ACCEPTED BY:
TRW	**INPUT**
Name ______________________	Name ______________________
Title ______________________	Title ______________________
Date ______________________	Date ______________________

CLIENT CASE STUDY

INPUT

Leveraging Worldwide Telecommunications Capabilities

The Client

A multi-billion dollar corporation

Client Objectives

The client's network is very large (tens of thousands of nodes) and supports external customers. The network will need extensive investment throughout the 1990s in order to remain technically and commercially competitive: should this investment be made?

The client needed to thoroughly understand market issues in order to decide if it should aggressively pursue external customers. A key issue was the competitive environment:

- Market directions concerning the provision of basic circuits? Could the client be competitive?
- Types of enhanced communications facilities supplied to major prospects (e.g., OSI, frame relay, video)?
- Could the client become a player in providing communications services, such as electronic mail or EDI?
- Competitors' strategies
- Customer satisfaction of competitors' offerings across geographies and segments
- Client capabilities compared to current and potential competitors
- Differences in opportunities in the U.S., Europe and the Pacific Rim

INPUT's Role

INPUT worked with the client over a four month period.

- INPUT interviewed client management to identify capabilities, plans and business issues. Several critical problems and opportunities were identified.
- INPUT developed a research program for interviewing decision makers in major corporations around the world concerning the competitive environment.
- Information was developed on major competitors.
- The research direction was modified several times as phased, preliminary findings were reviewed with the client.

Client Benefits

INPUT's study addressed all of the clients objectives. In the course of the study many of the client's original assumptions were modified or redirected. The client developed a new business plan which integrated its network capabilities with others capabilities. The client commented after the study's completion that their planning would have been much less productive without INPUT's unique market-driven analysis and recommendations.

CLIENT CASE STUDY

Developing An Innovative Software Maintenance Business

The Client

A division of a major aerospace firm

Client Objectives

In the mid-1980s, the client was successful in supplying a full range of traditional support and maintenance services. The client needed to expand into new areas, one of which being supplying software maintenance services. The client had no model for doing this, because at the time very few firms or any kind and none of its principal competitors were offering software support for systems not originally developed by themselves.

INPUT's Role

INPUT worked with the client over a two year period to develop a business case and to help establish the business.

Initially, INPUT performed face-to-face field research to determine whether there was a market. INPUT and the client were both surprised by the amount of support and receptivity offered at both command and technical customers levels for such a service.

INPUT prepared a day-long presentation on the opportunity for a skeptical audience of several dozen technical and marketing managers from other divisions of the parent. INPUT took the lead in preparing an initial business case for corporate approval.

INPUT and the client conducted additional research on market needs and prepared a final business plan which was approved. INPUT played a major role in preparing the market, technical opportunities, competitive and financial sections of the plan.

INPUT assisted in forming the initial organization and interviewing prospective managers. For six months after the launch, INPUT helped monitor the progress of the business.

Client Benefits

INPUT played a critical role in every step of business development.

INPUT

CLIENT CASE STUDY

Operational Systems Assessment

The Client

A major high tech manufacturer of specialized and off-the-shelf computer chips

Client Objectives

The client had recently centralized their data processing function under a single executive and needed to develop a plan and the necessary processes to insure that the information systems function could respond to rapidly changing business needs. Specific objectives were to:

- Provide an assessment of the current operational systems environment in terms of users' short-term needs.
- Examine the approaches taken by other firms in the industry in deal with these systems requirements.
- Develop a long range technology strategy and processes to insure the migration to that environment.
- Assess how outside resources could be utilized in achieving the company's objectives.

INPUT's Role

INPUT interviewed all major operating executives of the firm to establish their short term needs, obtain their views on optimal relationships with the systems function, and long range objectives which would be impacted by the use of systems. Profiles for each organization were created.

INPUT, working with the newly formed systems organization, profiled all major operational systems and the current plans for modifications to these systems. Key managers within the systems organization were also interviewed to obtain their views on relationships with the operating units.

INPUT prepared and presented to the company's executive committee a synopsis of the results of the study, including specific recommendations, and subsequently assisted the organization in initiating action plans for implementation.

Client Benefits

Through implementation of key recommendations and changes in process the client was able to:

- Implement short term fixes to existing systems to rapidly meet user's short term requirements for management information.
- Identify specific areas where outsourcing could upgrade capabilities at reduced costs.
- Establish new communications processes between IS and its clients to insure improved responsiveness of IS and continuous monitoring of satisfaction levels.

CLIENT CASE STUDY

Planning Comprehensive Client/Server Support Services

The Client

A worldwide supplier of IT products and services

Client Objectives

- To size the overall U.S. market for client/server-related support services (defined broadly)
- To quantify the size and growth rates of vertical markets, different customer sizes and other factors
- To identify the most-needed services -- those needed currently as well as those needed in the future
- To understand the client's market position as well as current and future competition
- To assess the regional differences in the above factors
- To understand the relationship, if any, between supplying products and related services

INPUT's Role

Over a three month period, INPUT:

- Assisted in focusing and defining the client's objectives
- Developed a primary research plan and conducted research to address the client's objectives
- Analyzed the quantitative and qualitative results of the research
- Prepared a written report and presentation materials
- Presented findings to client management

Client Benefits

As a result of this engagement, the client received actionable information covering all the client's original objectives.

The study produced additional, important findings, such as

- The study showed how the client could shape the market's direction.
- The client took action to change its perceived strengths and weaknesses in this market.
- The study greatly increased the client's understanding of how an existing product relationship can support the delivery of services. Changes were made to the marketing plan as a result.

The information from this study was critical input for the client in making extensive modifications to its previous tactical implementation plan.

Thomas J. O'Flaherty
Vice President

PROFILE

CAPABILITIES

- Provide consulting advise on market strategy, new products and services, growth/diversification alternatives. Two systems initiatives added $13 million and $21 million to the bottom line.
- Design and manage research projects for determining market needs, competitive positioning, and the viability of products and services.
- Experience includes over 250 research and consulting assignments for clients ranging from start-ups to firms such as ADP, American Express, Ameritech, Andersen Consulting, AT&T, BMW, Citicorp, Continental Insurance, Coopers & Lybrand, Digital Equipment, Ernst & Young, Ford Aerospace, General Motors, GTE, IBM, ITT, Marriott Corporation, McKinsey & Co., Mobil, Oracle, TRW, and Unisys.

BACKGROUND

- Director of Research, Broadview Associates. Responsible for professional support functions (company analysis, client consulting, proprietary data base development) for an international investment banking firm specializing in information technology.
- Principal, Information Service Strategies. Consultant on markets and products. Marketing director for start-up firm offering innovative PC communications product.
- Principal Consultant, INPUT. Directed research and consulting projects for a variety of clients.
- Hands-on experience at every IS department level, including IS Director.

EDUCATION/PROFESSIONAL ACTIVITIES

- B.A., Colgate University
- Certificate in Data Processing (CDP)
- Member of the ACM, the Society for Information Management, and a founding member of the American Association for Medical Systems and Informatics. Extensive speaking to professional groups.
- Regular contributor to Computerworld Softline column, 1993-1990
- The Consulting Editor, Software Engineering, since 1991

PETER A. CUNNINGHAM
PRESIDENT

PROFILE

- Mr. Cunningham has 28 years of experience in the information technology industry, including over 20 years of P&L responsibility in consulting.
- Mr. Cunningham provides information and advice to users and vendors of information technology. He specializes in analysis and forecasting of major trends in the industry, particularly in software, services, and the impact of information technology on people and organizations.
- In 1974, Mr. Cunningham founded INPUT to provide planning services, market research and consulting to buyers and vendors of IT products and services on a worldwide basis. The company specializes in analyzing and forecasting the applications and use of IT, particularly through the information services industry. This industry is now over $250 billion per year in size and is being driven by trends in outsourcing, systems integration, and downsizing. INPUT's mission is to provide its clients the ability to benefit from these and other IT trends and opportunities.
- Previously, he was a founder and President of J.W. Goodhew and Associates, Inc., a Washington, D.C. data processing consulting company specializing in the Medicaid, association, and manufacturing industries, as well as the federal government. Prior to that, Mr. Cunningham was with Management Science America, responsible for data processing projects in government and industry.
- Mr. Cunningham came to the United States with C-E-I-R, for whom he performed systems development and management.
- Mr. Cunningham started his career with ICL in 1964 in systems software development.

EDUCATION

- B.Sc. (Physics), Associate of the Royal College of Science, Imperial College, London
- M.P.A. (Technology of Management), The American University, Washington, D.C.

MEMBERSHIPS

- Fellow of the British Computer Society
- Member of the Worshipful Company of Information Technologists (Guild of the City of London)

4/13/93

JOHN A. MCGANN
PRINCIPAL CONSULTANT

PROFILE

CAPABILITIES

- Mr. McGann has 30 years of experience in the computer industry, including experience in IS management as well as in marketing and consulting in the information services industry.

BACKGROUND

- With INPUT, Mr. McGann provides consulting services to executives and planners in the computer industry and at user organizations. He specializes in analyzing marketing and product plans and forecasting trends in the use of information services.
- Previously, he was a Vice President of Information System Planning at Chase Bank, specializing in correspondent banking and funds transfer projects. Prior to that, Mr. McGann held management planning positions at American Airlines and Allied Corporation, where he was responsible for the introduction of new IS software and hardware technology.

EDUCATION

- B.S., Electrical Engineering/Economics, Massachusetts Institute of Technology
- M.A., Economics, Columbia University

INPUT

LAURA HAGGERTY
PROGRAM MANAGER
INFORMATION SERVICES VENDOR ANALYSIS PROGRAM

PROFILE

CAPABILITIES

- For the last five years, Ms. Haggerty has specialized in both the analysis of key issues for companies in high-technology industries and the delivery of business information to companies via electronic media. Projects included the selection of text management software, the design of competitive intelligence systems, the development of key strategic joint ventures in the information industry, and the delivery of an on-line data base offering private company information.
- At INPUT, Laura Haggerty is the Vendor Analysis Program Manager and will develop systems for delivering INPUT reports via electronic media.

BACKGROUND

- From 1990-1992, Ms. Haggerty held the position of Manager, Business Product Development for Information Access Company, a vendor of CD ROM and on-line data bases. Her activities centered on the delivery of competitive information via CD ROM and on-line data bases to the corporate market.
- After receiving her Master's of Library and Information Science in 1987, Ms. Haggerty went on to manage the information resources of the Ernst & Young High Tech Group from 1987 to 1990. Her responsibilities included: data base development, providing primary and secondary research capabilities, management of competitive intelligence and contributing to the support of Ernst & Young's high-technology clients and their information needs.

EDUCATION

- B.A. (Sociology), State University of New York at New Paltz, New Paltz, NY
- M.L.I.S (Master's of Library and Information Science), University of California at Berkeley, Berkeley, CA

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	0998
CONNECTION TEL	15164840479
CONNECTION ID	
START TIME	06/21 10:54
USAGE TIME	06'55
PAGES	12
RESULT	OK

Project File

YTR

(no rpt)

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	7826
CONNECTION TEL	1 415 961 3967
CONNECTION ID	PROD
START TIME	11/19 13:18
USAGE TIME	06'36
PAGES	11
RESULT	OK

75
25
15

INPUT®

IT Intelligence Services

400 Frank W. Burr Blvd.
Teaneck, NJ 07666
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Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: 11/18

Confidential: Y / N
Urgent: Y / N

To: Name: Renee
Tel./Location:
Co.:
Fax No:

Page: 1 of 11

File: Chron
Contact
Other:

From: Name: TQ2
Subject: TRW

They authorized Phase A of proposal
+ part of B ($3,500) per my memo
to TRW of 10/14

Proposal

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

Submitted to

TRW

October 13, 1993

Submitted by

INPUT

The Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666

201-801-0050
Fax: 201-801-0441

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

I. OBJECTIVES

- Determine how to maximize value to TRW of the current information services business
- Determine alternative scenarios for TRW in the information services industry
- Recommend near and long term overall strategies for TRW in the information services industry

II. SCOPE

The study has two elements:

- Market assessment and strategy development
- Implementation of the strategy

This proposal addresses the first element, market assessment and strategy development. Implementation will in large part depend on the results of the initial phase.

The issues to be addressed in the initial phase, market assessment and strategy development, include the following:

- What are market conditions in TRW's current information service markets? This includes
    - Size
    - Growth
    - Customer characteristics and requirements
    - Technology requirements (e.g., converging of computers and communications, client/server)
    - Market trends

  Markets assessed will include: Credit services, other financial services, systems integration and other markets specified by TRW.

- How well is TRW addressing its current target information service markets? What additional internal resources and capabilities can TRW mobilize to improve its position in current markets? What external capabilities does it require? ("Capabilities" include, but are not limited to, such factors as technology, applications, market share and position, staff expertise, customer perceptions, sales and marketing.)

- What "adjacent" markets should TRW consider addressing? These can include:

  - New/expanded offerings to current customer sets.

  - Modifications of current offerings/capabilities to new customer sets.

  - To what extent will specific capabilities such as communications expertise be a factor?

- What are the characteristics of these "adjacent" markets in terms of

  - Size
  - Growth
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  - Technology requirements
  - Market trends

- What is TRW's competitive position in its current and potential markets in terms of

  - TRW's market share
  - TRW's growth vs. market growth
  - TRW's capabilities vs. market requirements
  - TRW's Capabilities vs. those of major competitors

- What are the profiles of major competitors? Profiles will include (but are not limited to):

  - Target markets, market share and growth
  - Capabilities (technical, applications, etc.)
  - Synergies (or lack) between major business components
  - Strengths and weaknesses
  - Strategic direction

  Competitors to be profiled fall into at least two groups:

  - Companies that are similar to TRW (e.g., Hughes, Martin Marietta, Lockheed, Rockwell, McDonnell Douglas). Note: It may be important to understand the strategies and motivations of companies that were formerly in the information services business.

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- What is the assessment of TRW's strategic alternatives? These include
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  - Mobilizing and applying internal capabilities in a more intense and directed manner; applying capabilities from one part of the business to another part.
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  Assessments will include, but not be limited to,

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INPUT views the study as being an interactive one in which both INPUT and TRW will contribute data, knowledge, and analysis. INPUT's primary role will be to supply market and competitive data and analysis; however, INPUT believes that it will also be able to make important contributions concerning TRW's offerings and capabilities. INPUT believes that the study's overall findings and recommendations will be a joint product of INPUT and TRW efforts.

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The study will be directed by Thomas O'Flaherty, Vice President, who has directed over 200 custom research and consulting assignments for a variety of major firms. Other members of the project team will include:

- Peter Cunningham, President
- Laura Haggerty, Director, Vendor Analysis Program
- John McGann, Principal Consultant

Project staff biographies are in Appendix B.

IV. SCHEDULE

The following schedule targets completion of the analysis and recommendation tasks by mid-December. This assumes an October approval and startup.

Week	Activity
1	Initial presentation/worksession on current markets (all worksessions: Redondo Beach):
2	Second worksession: · Initial identification of internal capabilities · Identify "adjacent markets" · Identify competitors for profiling
3	INPUT conducts additional market analysis and prepares draft competitor profiles
4	Third worksession · INPUT presents additional market information · INPUT and TRW discuss impact of "mobilizing" TRW internal capabilities · Identification of preliminary gap analysis: TRW vs. market requirements; TRW vs. competitors · Identification of strategic scenarios
5	INPUT and TRW perform additional analysis on strategic scenarios (Note: schedule takes holidays into account)
6	Fourth worksession: · Strategic scenarios reviewed · Implementation plan drafted
7	Presentation/report prepared

INPUT can begin work within one week of authorization.

VII. AUTHORIZATION

To authorize the project as specified, please sign and return one copy of this proposal, along with the initial fee. Upon acceptance by INPUT, a countersigned copy of the proposal will be returned to TRW.

AUTHORIZED BY:	ACCEPTED BY:
TRW	**INPUT**
Name	Name
Title	Title
Date	Date

INPUT®

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 14, 1993

To: Steve Patay, TRW

Fm: Tom O'Flaherty, INPUT

Sub: Symposium on TRW Capabilities

(1) This will confirm my conversation with you and Linda today and yesterday that I will be able to attend. However, due to prior commitments, I will not be able to arrive at Building E-2 until approximately 11 am Wednesday, October 20; I will be available until the completion of the meeting the next day.

(2) The fee for this attendance will be $3,500 if charged for separately. There would be no charge if Task "B" in INPUT's proposal of October 13 is authorized.

(3) The attached form is what I will use myself to "rate" each capability. If there is time and you feel it is appropriate, it would be useful if each presenter would explicitly address the three questions in their presentations (i.e, current and potential positioning and thoughts on the market opportunity).

As noted on the form, I would expect the presenters to have a fairly good idea how their capability compared to other sources. I would not necessarily expect them to have a very good idea on market acceptability (i.e, A2 may be better than B2 if time to market is important; "can't rates" are generally either very attractive or very unattractive; etc.)

I would also appreciate your sending me an agenda or other materials on the symposium.

TOF
copy

SYSTEMS INTEGRATION OPPORTUNITIES FOR DEFENSE AND SPACE/IS&S

OVERVIEW

Prepared for

TRW

March 7, 1991

INPUT
Atrium at Glenpointe
400 Frank W. Burr Boulevard
Teaneck, New Jersey 07666
(201) 801-0050

AGENDA

- **Objectives**
- **Overview**
- **Systems Integration: Markets**
- **Systems Integration: Competitive Issues**
- **TRW Position**

OBJECTIVES

①

- Understand information services market (Overview)
  - Composition
  - Trends
  - Opportunities

② U.S

Commun.
Not weapons Sys
· Embedded

- ③ Understand systems integration markets (MIS/ADP)
  - Federal (DOD, Civilian)
  - Commercial
  - Trends, opportunities
  - Competition
- Preliminary assessment of TRW position

OVERVIEW

INPUT

California, New York, Washington D.C.,
London, Paris, Tokyo

Primary Research Emphasis

Senior Executives Experienced in Information Services

Forecast from Comprehensive Data Base

INPUT

MS-7

Notes

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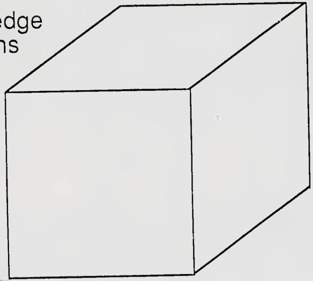
Segmentation



③ Knowledge Domains

① Customer Types
Vertical mkts

② Delivery Modes
- SW Prod
- SI
- (- Standalone Prof Svcs)
- Elec Info Svcs
- Trans proc

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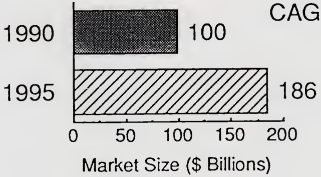
KNOWLEDGE DOMAINS

- **Applications, e.g., security trading systems, CAD/CAM, billing systems**
- **Technical, e.g., UNIX, networking, relational DBMS**
- **Composite, e.g., imaging, transaction processing, computer security**

U.S. Information Services Market, 1990-1995

near term uncertainties



CAGR=13%

inc infl ~24%

INPUT

MF-3

Notes

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SYSTEMS INTEGRATION

- **Markets**
- **Customer Requirements**

SI Definition

- Vendor-provided service
- Complete solution to complex requirement for:
  - Information systems
  - Networking
  - Automation
- Custom selection and implementation of products and services

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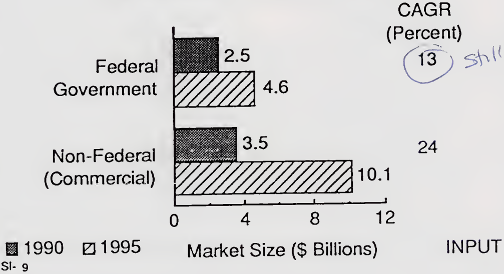
U.S. Systems Integration Market by Sector, 1990-1995



still gov't - ≃ 40 ISvc

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SI- 9

Notes

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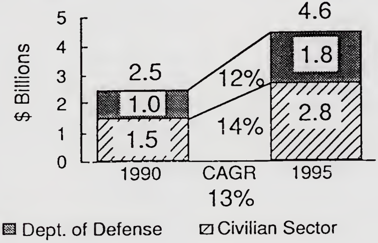
Civilian vs. DoD Federal SI Expenditures, 1990-1995



but budgets/priorities moving target

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SI-39

Notes

1/21/91

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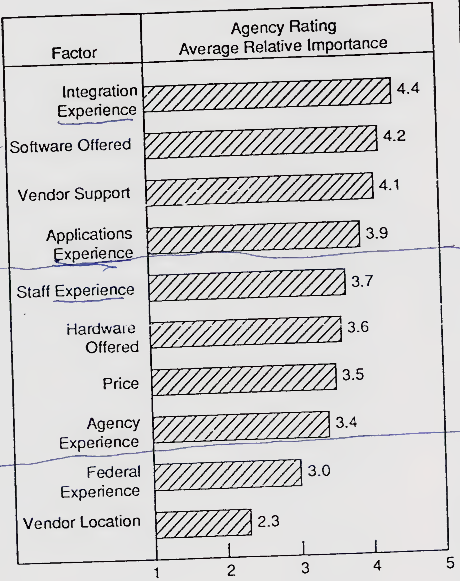
Fed

Importance of Systems Integration Contractor Performance Characteristics

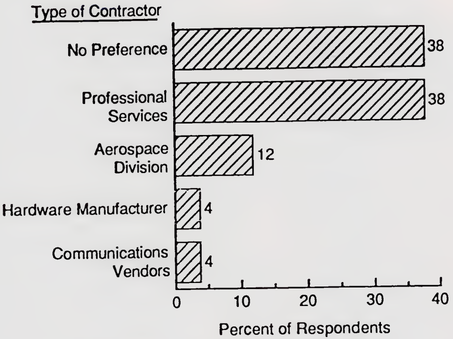
exp



Fed

Top

Preference for Type of Systems Integration Contractor



Note: Because of rounding, figures do not add to 100%.

Agency Suggestions for Improvements to Vendor Services

Appl & context

Rank	Suggestion
1	Understand project issue/task/agencies' way of doing business
2	Improve communication with agency
2	Reduce system life cycle and maintenance costs
2	Adopt government standards
3	Use more-capable/experienced staff
3	Deliver on time
3	Improve program management
3	Improve testing prior to software release
3	Improve ease of transition to new system
3	Know your own market and compatibility
3	Remain flexible; agencies' budgets do change
3	Improve use of automated tools

"Tech"

VENDOR SELECTION CRITERIA: COMMERCIAL CUSTOMERS

Type	Frequency of Use* (Percent)
Industry Experience	86
Application Knowledge	86
Cost/Performance higher than Fed	86
SI Experience	79
Project Management Skills	64
Support Skills	64
Service Orientation	50
On-Site Visits	43
References	43
Alliances	21

Tech/
Generic

* Multiple responses permitted.

SYSTEMS INTEGRATION: COMPETITIVE ISSUES

- **Market Shares**
- **Skills, Profitability**
- **Issues**

Market Share by Competition Class

	Vendor Class	Percent of Market		
		Federal	Commercial	Overall
	Hardware manufacturers	21	24	23
Telco	Communication vendors	6	12	9
CSC	Professional services	50	30	40
	"Big 6"	4	12	8
	Aerospace	15	? 9	12
	Other	4	13	8

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SI-27

Notes

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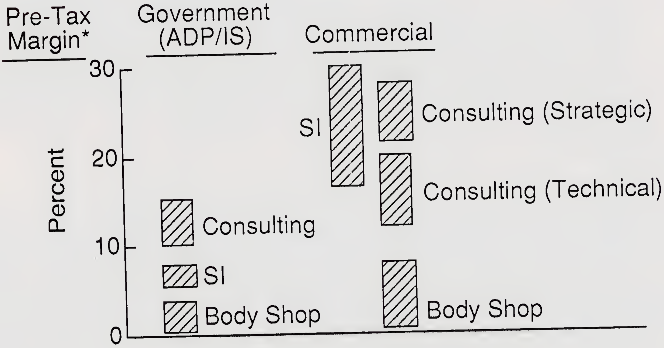
V. Imp

Commercial versus Federal Systems Integration Characteristics

Characteristic	Commercial	Federal
Customers what they have		
Requirements knowledge	Low	High
Technical knowledge	Variable	High
Interface	Multiple	Single
Vendors		
Vertical expertise	Preferred	Mandatory
Customer base	Leverageable	Reference
Business knowledge	Required	Optional
Reputation	Media-based	Historic
Business Conditions		
Lead generation	Field sales	CBD/budgets
Competitive bids	Optional	Required
Bid complexity	Variable	High
Expenditure commitment	Deferrable	Guaranteed
Risk exposure	High	Contained
Contract type	Fixed-price	Combination
Price restrictions	Competitive	Ceilings
Bonuses	Unlikely	Awd./incent.
Penalties	Unlikely	Exception
Profit potential	High	Limited

Typical Professional Services Margins



* Includes partnership distribution

Source: INPUT estimates

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Key Federal SI Market Factors

- Negative
  - Deficit and budget pressures
  - Systems maintenance resource burden
  - Slow standards implementations
  - Extended implementation schedules
  - CIM initiative

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Notes

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Key Commercial SI Market Factors

- Negative
  - "In-house" competitive threat
  - Growing concerns over maintenance issues
  - "Wait-and-see" track records
  - Economic recession

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Notes

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TRW

- **Market Strategy Issues**
- **Sales Execution (Proposals)**

TRW PROFILE

Factor	**ISG**	**IS&S**
Technical	UNIX Signal Processing Complex SI/ Project Mgt. SW Engineering Methodologies/ Rapid Proto Expert Systems Computer Security Fault Tolerant Systems	Imaging Software and Equipment Data Bases Specialized Networks
Applications	GIS Hazardous Waste Disposal Bi-Lingual IS	Financial Transactions Document Handling Credit Marketing Data Bases
Customer types	DOD	Financial Sector Credit Grantors Real Estate
Cost Structure	Above Average	Average (?)

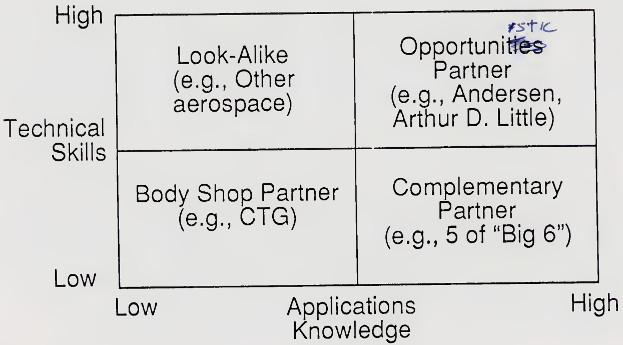
PREFERRED INTENSITY OF OPPORTUNITY CHARACTERISTICS BY TRW FOR SYSTEMS INTEGRATION INITIATIVES

Opportunity Characteristics	Preferred Intensity Low	Preferred Intensity High
Customer business need for system (growth, profitability)		X
Financial strength of customer		X
Importance of technology		X
Importance of reliability		X
Customer risk-aversion	Technical	Vendor
Size of project		X
Degree system component is segmentable from business process		X

PARTNERING

- Acquisition of applications knowledge
- Tactical versus strategic
    - Short-term, individual opportunities
    - Long-term, complementary

Partner Alternatives



Technical Skills	Low Applications Knowledge	High Applications Knowledge
High	Look-Alike (e.g., Other aerospace)	Opportunit~~ies~~stic Partner (e.g., Andersen, Arthur D. Little)
Low	Body Shop Partner (e.g., CTG)	Complementary Partner (e.g., 5 of “Big 6”)

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PREREQUISITES FOR SUCCESSFUL PROPOSAL

- Right project manager
- In-depth program/functional knowledge
- Marketing and pre-selling
- Client agency understanding
- Knowledge of available funding
- Good quals
- Detailed/specific technical approach

Proposal Review— Key Themes

- More tailored solutions
- Better labor mix
- Lower priced subcontractors
- Tighter cross-referencing
- More sizzling graphics

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CONCLUSIONS

- **Necessarily tentative**

- **Mosaic of opportunities**
  - **Individual sub-niches**
  - **Not "Imaging", but specific applications in specific markets**
  - **Cost/benefit/technology relationships constantly changing**

- **Applications knowledge critical**
  - **Target organic skills**
  - **"Composite" knowledge domains are a good target**
  - **Partnering strategy**

- **Review recent ADP/IS efforts**

INPUT®
IT Intelligence Services

400 Frank W. Burr Blvd.
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Tel. (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: Oct 13

Confidential: Y / N
Urgent: Y / N

To: Name: Ron Sugar
Tel./Location: 310-814 6446
Co.: TRW
Fax No: 310-813- 2412

Page: 1 of 19

File: Chron
Contact
Other:

From: Name: Tom OFlaherty
Subject: Proposal

This incorporates the presentation activity for Friday Oct 22

ADM 341/05 8/93

INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 13, 1993

Mr. Ronald Sugar
Vice President-Group Development
TRW Space and Electronics Group
One Space Park
Redondo Beach, CA 90278

Dear Ron:

INPUT is pleased to submit the attached proposal for helping you assess your opportunities in the information services industry.

INPUT has had a long and successful record of evaluating and advising firms on their position and opportunities in the information systems business. Clients with such relationships have included IBM, Andersen Consulting, McKinsey & Co., Boeing Computer Services, McDonnell Douglas, Ford Aerospace, General Motors/EDS Citicorp, Bank of America, and Continental Insurance.

INPUT has in-depth experience in all the areas of investigation and will be able to perform a comprehensive assessment for TRW. We will treat this as a confidential, priority effort and will assign a small cadre of senior staff to this study.

If you have any questions, please give one of us a call. We look forward to working with you and others at TRW, and believe that we can be of great assistance in this effort.

Sincerely,

PAC by TO

Peter A. Cunningham
President

Thomas O'Flaherty
Vice President

Attachment

Proposal

ASSESSMENT OF TRW'S BUSINESS OPPORTUNITIES IN THE INFORMATION SERVICES INDUSTRY

Submitted to

TRW

October 13, 1993

Submitted by

INPUT

The Atrium at Glenpointe
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The study will be directed by Thomas O'Flaherty, Vice President, who has directed over 200 custom research and consulting assignments for a variety of major firms. Other members of the project team will include:

- Peter Cunningham, President
- Laura Haggerty, Director, Vendor Analysis Program
- John McGann, Principal Consultant

Project staff biographies are in Appendix B.

IV. SCHEDULE

The following schedule targets completion of the analysis and recommendation tasks by mid-December. This assumes an October approval and startup.

Week	Activity
1	Initial presentation/worksession on current markets (all worksessions: Redondo Beach):
2	Second worksession: • Initial identification of internal capabilities • Identify "adjacent markets" • Identify competitors for profiling
3	INPUT conducts additional market analysis and prepares draft competitor profiles
4	Third worksession • INPUT presents additional market information • INPUT and TRW discuss impact of "mobilizing" TRW internal capabilities • Identification of preliminary gap analysis: TRW vs. market requirements; TRW vs. competitors • Identification of strategic scenarios
5	INPUT and TRW perform additional analysis on strategic scenarios (Note: schedule takes holidays into account)
6	Fourth worksession: • Strategic scenarios reviewed • Implementation plan drafted
7	Presentation/report prepared

INPUT can begin work within one week of authorization.

VI. FEE

The professional fee for the study will be $72,000. One-half of this fee ($36,000) is due and payable upon authorization. The remainder of the professional fee plus out-of-pocket expenses is due upon the submission of the final report or presentation. Out-of-pocket expenses primarily include travel, telephone, and report preparation will be charged at cost.

At TRW's request, the work has been further broken out into four functional units and the professional fee priced accordingly. The sum of the individual units is more than the professional fee for the entire project because of efficiencies when the project is planned and perform simultaneously. Because of the fast track nature of the assignment, INPUT does not believe that it is practical to perform functional units of work sequentially.

	Function Unit of Work	Associated Professional Fee
A.	Market overview preparation and presentation	$8,000
B.	Analysis of internal capabilities and expansion to adjacent markets	$21,000
C.	In-depth competitive analysis of eight competitors	$25,000
D.	Scenario analysis and final report	$25,000

Note: If "D" is elected without "B" or "C", INPUT may choose to further define the areas of "Scope" which it will be responsible for.

The above figures are for the professional fee only. Reasonable documented out-of-pocket expenses will be charged for work in each functional unit.

TRW may authorize the study by signing below.

VII. AUTHORIZATION

To authorize the project as specified, please sign and return one copy of this proposal, along with the initial fee. Upon acceptance by INPUT, a countersigned copy of the proposal will be returned to TRW.

AUTHORIZED BY:	ACCEPTED BY:
TRW	**INPUT**
Name	Name
Title	Title
Date	Date

Leveraging Worldwide Telecommunications Capabilities

The Client

A multi-billion dollar corporation

Client Objectives

The client's network is very large (tens of thousands of nodes) and supports external customers. The network will need extensive investment throughout the 1990s in order to remain technically and commercially competitive: should this investment be made?

The client needed to thoroughly understand market issues in order to decide if it should aggressively pursue external customers. A key issue was the competitive environment:

- Market directions concerning the provision of basic circuits? Could the client be competitive?
- Types of enhanced communications facilities supplied to major prospects (e.g., OSI, frame relay, video)?
- Could the client become a player in providing communications services, such as electronic mail or EDI?
- Competitors' strategies
- Customer satisfaction of competitors' offerings across geographies and segments
- Client capabilities compared to current and potential competitors
- Differences in opportunities in the U.S., Europe and the Pacific Rim

INPUT's Role

INPUT worked with the client over a four month period.

- INPUT interviewed client management to identify capabilities, plans and business issues. Several critical problems and opportunities were identified.
- INPUT developed a research program for interviewing decision makers in major corporations around the world concerning the competitive environment.
- Information was developed on major competitors.
- The research direction was modified several times as phased, preliminary findings were reviewed with the client.

Client Benefits

INPUT's study addressed all of the clients objectives. In the course of the study many of the client's original assumptions were modified or redirected. The client developed a new business plan which integrated its network capabilities with others capabilities. The client commented after the study's completion that their planning would have been much less productive without INPUT's unique market-driven analysis and recommendations.

CLIENT CASE STUDY

Developing An Innovative Software Maintenance Business

The Client

A division of a major aerospace firm

Client Objectives

In the mid-1980s, the client was successful in supplying a full range of traditional support and maintenance services. The client needed to expand into new areas, one of which being supplying software maintenance services. The client had no model for doing this, because at the time very few firms or any kind and none of its principal competitors were offering software support for systems not originally developed by themselves.

INPUT's Role

INPUT worked with the client over a two year period to develop a business case and to help establish the business.

Initially, INPUT performed face-to-face field research to determine whether there was a market. INPUT and the client were both surprised by the amount of support and receptivity offered at both command and technical customers levels for such a service.

INPUT prepared a day-long presentation on the opportunity for a skeptical audience of several dozen technical and marketing managers from other divisions of the parent. INPUT took the lead in preparing an initial business case for corporate approval.

INPUT and the client conducted additional research on market needs and prepared a final business plan which was approved. INPUT played a major role in preparing the market, technical opportunities, competitive and financial sections of the plan.

INPUT assisted in forming the initial organization and interviewing prospective managers. For six months after the launch, INPUT helped monitor the progress of the business.

Client Benefits

INPUT played a critical role in every step of business development.

CLIENT CASE STUDY

INPUT

Operational Systems Assessment

The Client

A major high tech manufacturer of specialized and off-the-shelf computer chips

Client Objectives

The client had recently centralized their data processing function under a single executive and needed to develop a plan and the necessary processes to insure that the information systems function could respond to rapidly changing business needs. Specific objectives were to:

- Provide an assessment of the current operational systems environment in terms of users' short-term needs.
- Examine the approaches taken by other firms in the industry in deal with these systems requirements.
- Develop a long range technology strategy and processes to insure the migration to that environment.
- Assess how outside resources could be utilized in achieving the company's objectives.

INPUT's Role

INPUT interviewed all major operating executives of the firm to establish their short term needs, obtain their views on optimal relationships with the systems function, and long range objectives which would be impacted by the use of systems. Profiles for each organization were created.

INPUT, working with the newly formed systems organization, profiled all major operational systems and the current plans for modifications to these systems. Key managers within the systems organization were also interviewed to obtain their views on relationships with the operating units.

INPUT prepared and presented to the company's executive committee a synopsis of the results of the study, including specific recommendations, and subsequently assisted the organization in initiating action plans for implementation.

Client Benefits

Through implementation of key recommendations and changes in process the client was able to:

- Implement short term fixes to existing systems to rapidly meet user's short term requirements for management information.
- Identify specific areas where outsourcing could upgrade capabilities at reduced costs.
- Establish new communications processes between IS and its clients to insure improved responsiveness of IS and continuous monitoring of satisfaction levels.

CLIENT CASE STUDY

Planning Comprehensive Client/Server Support Services

The Client

A worldwide supplier of IT products and services

Client Objectives

- To size the overall U.S. market for client/server-related support services (defined broadly)
- To quantify the size and growth rates of vertical markets, different customer sizes and other factors
- To identify the most-needed services -- those needed currently as well as those needed in the future
- To understand the client's market position as well as current and future competition
- To assess the regional differences in the above factors
- To understand the relationship, if any, between supplying products and related services

INPUT's Role

Over a three month period, INPUT:

- Assisted in focusing and defining the client's objectives
- Developed a primary research plan and conducted research to address the client's objectives
- Analyzed the quantitative and qualitative results of the research
- Prepared a written report and presentation materials
- Presented findings to client management

Client Benefits

As a result of this engagement, the client received actionable information covering all the client's original objectives.

The study produced additional, important findings, such as

- The study showed how the client could shape the market's direction.
- The client took action to change its perceived strengths and weaknesses in this market.
- The study greatly increased the client's understanding of how an existing product relationship can support the delivery of services. Changes were made to the marketing plan as a result.

The information from this study was critical input for the client in making extensive modifications to its previous tactical implementation plan.

Thomas J. O'Flaherty
Vice President

PROFILE

CAPABILITIES

- Provide consulting advise on market strategy, new products and services, growth/diversification alternatives. Two systems initiatives added $13 million and $21 million to the bottom line.
- Design and manage research projects for determining market needs, competitive positioning, and the viability of products and services.
- Experience includes over 250 research and consulting assignments for clients ranging from start-ups to firms such as ADP, American Express, Ameritech, Andersen Consulting, AT&T, BMW, Citicorp, Continental Insurance, Coopers & Lybrand, Digital Equipment, Ernst & Young, Ford Aerospace, General Motors, GTE, IBM, ITT, Marriott Corporation, McKinsey & Co., Mobil, Oracle, TRW, and Unisys.

BACKGROUND

- Director of Research, Broadview Associates. Responsible for professional support functions (company analysis, client consulting, proprietary data base development) for an international investment banking firm specializing in information technology.
- Principal, Information Service Strategies. Consultant on markets and products. Marketing director for start-up firm offering innovative PC communications product.
- Principal Consultant, INPUT. Directed research and consulting projects for a variety of clients.
- Hands-on experience at every IS department level, including IS Director.

EDUCATION/PROFESSIONAL ACTIVITIES

- B.A., Colgate University
- Certificate in Data Processing (CDP)
- Member of the ACM, the Society for Information Management, and a founding member of the American Association for Medical Systems and Informatics. Extensive speaking to professional groups.
- Regular contributor to Computerworld Softline column, 1993-1990
- The Consulting Editor, Software Engineering, since 1991

PETER A. CUNNINGHAM
PRESIDENT

PROFILE

- Mr. Cunningham has 28 years of experience in the information technology industry, including over 20 years of P&L responsibility in consulting.
- Mr. Cunningham provides information and advice to users and vendors of information technology. He specializes in analysis and forecasting of major trends in the industry, particularly in software, services, and the impact of information technology on people and organizations.
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- Previously, he was a founder and President of J.W. Goodhew and Associates, Inc., a Washington, D.C. data processing consulting company specializing in the Medicaid, association, and manufacturing industries, as well as the federal government. Prior to that, Mr. Cunningham was with Management Science America, responsible for data processing projects in government and industry.
- Mr. Cunningham came to the United States with C-E-I-R, for whom he performed systems development and management.
- Mr. Cunningham started his career with ICL in 1964 in systems software development.

EDUCATION

- B.Sc. (Physics), Associate of the Royal College of Science, Imperial College, London
- M.P.A. (Technology of Management), The American University, Washington, D.C.

MEMBERSHIPS

- Fellow of the British Computer Society
- Member of the Worshipful Company of Information Technologists (Guild of the City of London)

4/13/93

JOHN A. MCGANN
PRINCIPAL CONSULTANT

PROFILE

CAPABILITIES

- Mr. McGann has 30 years of experience in the computer industry, including experience in IS management as well as in marketing and consulting in the information services industry.

BACKGROUND

- With INPUT, Mr. McGann provides consulting services to executives and planners in the computer industry and at user organizations. He specializes in analyzing marketing and product plans and forecasting trends in the use of information services.
- Previously, he was a Vice President of Information System Planning at Chase Bank, specializing in correspondent banking and funds transfer projects. Prior to that, Mr. McGann held management planning positions at American Airlines and Allied Corporation, where he was responsible for the introduction of new IS software and hardware technology.

EDUCATION

- B.S., Electrical Engineering/Economics, Massachusetts Institute of Technology
- M.A., Economics, Columbia University

LAURA HAGGERTY
PROGRAM MANAGER
INFORMATION SERVICES VENDOR ANALYSIS PROGRAM

PROFILE

CAPABILITIES

- For the last five years, Ms. Haggerty has specialized in both the analysis of key issues for companies in high-technology industries and the delivery of business information to companies via electronic media. Projects included the selection of text management software, the design of competitive intelligence systems, the development of key strategic joint ventures in the information industry, and the delivery of an on-line data base offering private company information.
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EDUCATION

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4/13/93

INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 13, 1993

Mr. Ronald Sugar
Vice President-Group Development
TRW Space and Electronics Group
One Space Park
Redondo Beach, CA 90278

Dear Ron:

INPUT is pleased to submit the attached proposal for helping you assess your opportunities in the information services industry.

INPUT has had a long and successful record of evaluating and advising firms on their position and opportunities in the information systems business. Clients with such relationships have included IBM, Andersen Consulting, McKinsey & Co., Boeing Computer Services, McDonnell Douglas, Ford Aerospace, General Motors/EDS Citicorp, Bank of America, and Continental Insurance.

INPUT has in-depth experience in all the areas of investigation and will be able to perform a comprehensive assessment for TRW. We will treat this as a confidential, priority effort and will assign a small cadre of senior staff to this study.

If you have any questions, please give one of us a call. We look forward to working with you and others at TRW, and believe that we can be of great assistance in this effort.

Sincerely,

PAC by [illegible]

Peter A. Cunningham
President

Thomas O'Flaherty
Vice President

Attachment

CLIENT CASE STUDY

INPUT

Leveraging Worldwide Telecommunications Capabilities

The Client

A multi-billion dollar corporation

Client Objectives

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4/13/93

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PRINCIPAL CONSULTANT

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LAURA HAGGERTY
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INFORMATION SERVICES VENDOR ANALYSIS PROGRAM

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EDUCATION

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- M.L.I.S (Master's of Library and Information Science), University of California at Berkeley, Berkeley, CA

4/13/93

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                    ***************************
                    ***   ACTIVITY REPORT   ***
                    ***************************

TRANSMISSION OK

TX/RX NO.                 7078
CONNECTION TEL                     13108132412
CONNECTION ID
START TIME                10/13 12:53
USAGE TIME                11'36
PAGES                      19
RESULT                    OK
```

ORDER/INVOICE/FULFILLMENT

Acctg. ONLY

Inv. Comp.	By:	Date:	Client #	Order #	Inv. #	Multi-Invoicing ______ of ______

CUSTOMER/INVOICE TO

ORIGINATOR (Signature) ______ DATE 10/15/93

Company TRW
Name Mr./~~Ms.~~ Steve Patay
Position VP
Address One Space Park
City Redondo Beach
Province ______
Phone 310 812 9603

CA Tax Rate ______
CT Tax 8% ______
Salutation ______
State CA
Zip 90278
Country ______
Fax 310 813 2412
Tlx ______

APPROVALS
VP Sales/Res. ______
Date ______
Controller ______
Date ______

Special instructions for invoicing, progress billing, or delayed payments, etc.
Bill end of Oct (will notify)

ORDER

Contract Year Beg. ______
End ______

☐ New Order (N1) ☐ Prior Yr (N3)
☐ Renewal (N2) ☐ Cancel

Invoice Type
☐ Fulfillment Only
☐ W/Order (OR)
☐ Monthly (MO)
☐ Quarterly (QT)
☐ Pending

Employee # Sold by:
______ ___%
______ ___%
______ ___%

Employee # Commission to:
______ ___%
______ ___%
______ ___%

CLIENT AUTH.

PO# ______
Attach all authorizing documents to white (contract) copy.

INPUT Contract ☐ Letter ☐ Verbal ☒
See att

SHIP TO

Company ______
Name Mr./Ms. ______
Position Same
Address ______
______
City ______

Province ______
Salutation ______
State ______
Zip ______
Country ______
Phone ______

ITEM TYPE

- Subscription (SB)
- Custom (YC/ZC/KC)VC
- Multiclient (MC)
- Reports (RP)
- Copies (CP)
- Consult/Present (PR)
- Newsletter (NL)
- Reimbursed Costs (EX)
- Merger/Acq. (ME)
- Exec Overview (EO)
- Conf/Seminar (CN)

DETAIL

Indicate US, UK, FR, VA	Prod. ID/Year	Item Type Code	Item Description or Title	Quantity	Price	Shipped By	Date
US	YTR	YC	Parts of 10/13		11,500		
			proposal				
			A & part of				
			B				
			+ expenses				
			(Presentation)				

Fulfillment to be completed in: ☐ Corporate ☐ London ☐ Virginia ☐ France ☐ Other ______

• White - Contract • Green - Fulfillment • Yellow - Invoice • Pink - Originator • Goldenrod - Sales Manager

M&S180 12/9

INPUT

PROJECT WORK STATEMENT

TITLE SI Opportunities / Presentation

CLIENT TRW

CONTRACT: ATTACHED____ TO FOLLOW____ LETTER____ VERBAL____

PROJECT LEADER TW PROJECT CODE____

DATE STARTED 10/14 PLANNED COMPLETION DATE 10/28

LEVEL OF EFFORT(Professional Man Days) 7

TOTAL CONTRACT VALUE: $ or £ 11,500

REVENUE DISTRIBUTION (% or $) INPUT US 100 INPUT LTD____

REIMBURSABLE EXPENSES: NO____

YES ✓

EXP. BUDGET ✓

TO COVER:
TRAV: ✓
TELE: ✓
RPT. PREP.:____
OTHER:____

BILLING SCHEDULE DESCRIPTION Bill at end

PROJECT DESCRIPTION

- Assess Tech opportunities
- Give SI presentation

INDICATE TYPE OF WORK: REPORT____ PRESENTATION ✓

THANK YOU PACKAGE: YES____ NO ✓

ACCOUNTING USE ONLY: ENTERED ON CURRENT PROJECT LIST____

DISTRIBUTI

CONTRACT FILE

LIBRARY FILE

NEW JERSEY

INPUT LTD.

Originator

SHEILA (Y&Z on

BINDER COPY

Date Typed

PROJECT SCHEDULE

YTR

Activity	Name	Act. Days	Factor	ESD	Week													
					10/15 1	10/22 2	3	4	5	6	7	8	9	10	11	12	13	14
Prepare					1													
Present					3	3												
TOTAL PLAN SR.	▨		▨	▨														
TOTAL PLAN RA	▨		▨	▨														
TOTAL PLAN ESDs	▨	▨	▨															

Proj. Code: ______ Proj. Name: TRW

Prepared by: TR

Page 1 of

Proj. Manager: ______ Date: 10/15

INPUT

Atrium at Glenpointe, 400 Frank W. Burr Blvd., Teaneck, NJ 07666 Tel. (201) 801-0050
Fax (201) 801-0441

October 14, 1993

To: Steve Patay, TRW

Fm: Tom O'Flaherty, INPUT

Sub: Symposium on TRW Capabilities

(1) This will confirm my conversation with you and Linda today and yesterday that I will be able to attend. However, due to prior commitments, I will not be able to arrive at Building E-2 until approximately 11 am Wednesday, October 20; I will be available until the completion of the meeting the next day.

(2) The fee for this attendance will be $3,500 if charged for separately. There would be no charge if Task "B" in INPUT's proposal of October 13 is authorized.

(3) The attached form is what I will use myself to "rate" each capability. If there is time and you feel it is appropriate, it would be useful if each presenter would explicitly address the three questions in their presentations (i.e, current and potential positioning and thoughts on the market opportunity).

As noted on the form, I would expect the presenters to have a fairly good idea how their capability compared to other sources. I would not necessarily expect them to have a very good idea on market acceptability (i.e, A2 may be better than B2 if time to market is important; "can't rates" are generally either very attractive or very unattractive; etc.)

I would also appreciate your sending me an agenda or other materials on the symposium.

VI. FEE

The professional fee for the study will be $72,000. One-half of this fee ($36,000) is due and payable upon authorization. The remainder of the professional fee plus out-of-pocket expenses is due upon the submission of the final report or presentation. Out-of-pocket expenses primarily include travel, telephone, and report preparation will be charged at cost.

At TRW's request, the work has been further broken out into four functional units and the professional fee priced accordingly. The sum of the individual units is more than the professional fee for the entire project because of efficiencies when the project is planned and perform simultaneously. Because of the fast track nature of the assignment, INPUT does not believe that it is practical to perform functional units of work sequentially.

	Function Unit of Work	Associated Professional Fee
A.	Market overview preparation and presentation	$8,000
B.	Analysis of internal capabilities and expansion to adjacent markets	$21,000
C.	In-depth competitive analysis of eight competitors	$25,000
D.	Scenario analysis and final report	$25,000

Note: If "D" is elected without "B" or "C", INPUT may choose to further define the areas of "Scope" which it will be responsible for.

The above figures are for the professional fee only. Reasonable documented out-of-pocket expenses will be charged for work in each functional unit.

TRW may authorize the study by signing below.

INPUT®

IT Intelligence Services

400 Frank W. Burr Blvd.
Teaneck, NJ 07666
Tel. (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Confidential: Y / N
Urgent: [✓ Y] / N

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Subject: TRW

Page: 1 of 6

File: Chron
Contact
Other:

ADM 341/05 8/93

BOB GOODWIN'S
TRW PRESENTATION
10/22/93

Bob Goodwin

Manager
Information Services
Market Analysis Program

INPUT

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1993: The Worst of Times

- Slow recovery from global recession
- Intense competition
- Demise of proprietary systems
- Mainframe and mini shipment decline
- Systems software's lower growth

MC3-BG-2a

INPUT

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1993: The Worst of Times

- Profit squeeze
- Client/server paradigm creates risks
- Complex user-driven solutions
- Longer selling cycles
- Maturation of major markets
- 12% CAGR, 1993-1998

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1993: The Best of Times

- Recovery from recession (slow)
- Globalization of IS
- Client/server creates opportunities
- Open systems standards and acceptance
- Customizable software products

MC3-BG-3a

INPUT

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1993: The Best of Times

- Business process change
- Multimedia
- Information super-highway
- PC/Workstation software products growth
- 12% CAGR, 1993-1998, $285 billion in aggregated new revenues

MC3-BG-3b

INPUT

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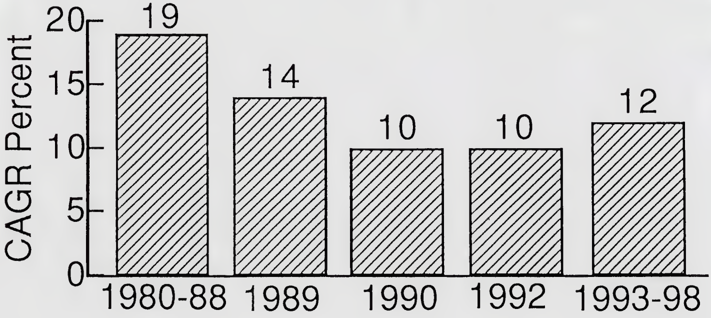
U.S. Information Services Industry: Annual Growth Rates



MC3-BG-5

INPUT

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Equipment Forecast Scenarios, 1993-98

- PC/Workstation

- Unit growth rate	25%
- Annual price erosion	20%
- Revenue growth	5%

MC3-BG-7a

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Equipment Forecast Scenarios, 1993-98

- Minicomputers

- Unit growth rate	6%
- Annual price erosion	8%
- Revenue growth	-2%

MC3-BG-7b

INPUT

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Equipment Forecast Scenarios, 1993-98

- Mainframes
  - Unit growth rate -3%
  - Annual price erosion 8%
  - Revenue growth -11%

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Systems Software Products Major Forecast Changes

	Market CAGR (%)	
	1992-97	1993-98
Mainframe	10	1
Mini	11	4
PC/Workstation	22	19
Total Market	14	8

MC3-BG-8

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Software Market Positioning Issues

- Major battle: Windows NT and NetWare/UNIX for server markets
- Standardization of UNIX operating system
- Control of operating system market brings control of application solutions

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Business Process Change Leverage on Information Services

BPC drives new information services

- Restructuring organizations
- Quality programs
- Cost reduction/value
- C/S architecture
- Imaging

MC3-BG-15

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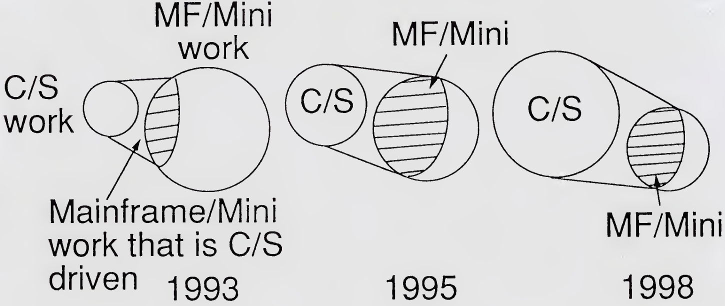
Client/Server Influence on Professional Services Work



MC3-BG-14

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Conclusions

The best of times *IS* here, for vendors who can:

- Invest in sales training
  - Sales staff
  - Support staff

MC3-BG-17d

INPUT

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Conclusions

The best of times *IS* here,
for vendors who can:

- Build alternate delivery channels
- Provide customizable products
- Offer a continuum of services

MC3-BG-17c

INPUT

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Conclusions

The best of times *IS* here,
for vendors who can:

- Provide software solutions on multiple operating systems
- Form alliances to expand client/server product scope, skill sets, market coverage

INPUT

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Conclusions

The best of times *IS* here,
for vendors who can:

- Leverage their expertise
  - Vertical market
  - Technology/establish technology centers

MC3-BG-17e

INPUT

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Revolutions

- Downsizing
- Outsourcing
- Re-engineering

- Networking
- Open Systems

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Distribution of Network Operating Systems

OS	Proportion of Responses (%)
Netware	74
LAN Manager	8
LAN Server	7
TCP	6
Other	10

MC3-PAC-11

INPUT

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Conclusions
Operating Systems

- Dislocation between client and server OS
  - Clients, DOS is 'there'
  - Servers, selection is open
- Novell dominates NOS—No change expected
- NT is not penetrating rapidly

MC3-PAC-14

INPUT

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Vendor Strategies
Systems Companies

- Establishing C/S units
  - IBM
  - Data General
  - Tandem
  - Amdahl
- Generally attacking market
  - DEC

MC3-PAC-20a

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Banking and Finance

IS Market Share

Company	Market Share (Percent)
EDS	7
First Financial Mgmt. Co.	6
Dow Jones	4
Andersen Consulting	4
Systematics	4
First Data Resources	3
IBM	3
FIserv	2
Mellon Info. Svcs.	2
M&I	1

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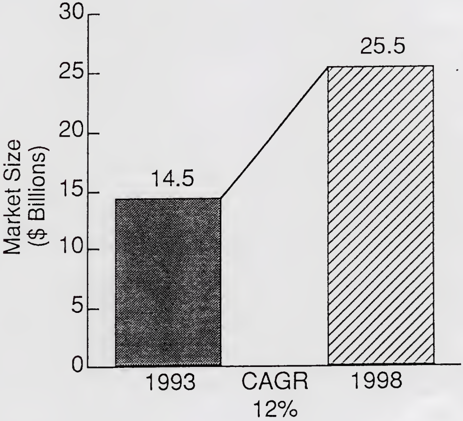
Banking and Finance

Information Services Market
1993-1998



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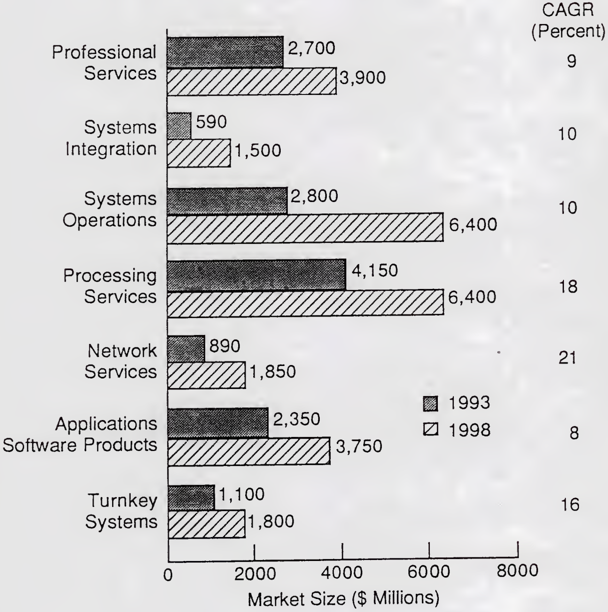
Banking and Finance

Information Services Market by Delivery Mode, 1993-1998



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Objectives and Plans of Information Systems Managers

- Cope with tight budgets and cost controls
- Evaluate and implement outsourcing as appropriate
- Integrate merged-bank systems
- Upgrade disaster recovery
- Implement RDBMSs
- Support "relationship banking"
- Explore imaging
- Research (only) most other information technologies

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Banking Industry Outsourcing Arrangements

Activity	Type of Processing*	Already Outsourced	Considering Outsourcing	Not Outsourced Considering
Credit Card Merchant Processing	B	52	3	45
Trust Processing	B	39	–	61
Mortgage Processing	B	33	13	54
Student Loan Processing	B	28	8	64
Mutual Fund Processing	B	26	1	73
Cash Management	B	6	1	93
Credit Card Issuance	F	34	–	66
Securities Safekeeping	F	20	–	80
ATM Driving/Switching	F	14	15	71
Data Center	F	14	2	84
Network Operations/ Management	F	13	8	79
Applications Maintenance Development/	F	4	18	78

*B = Line of Business Processing

F = Functional Processing

Source: American Banker/Ernst & Young Survey

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Cost Reduction Strategies Applied by Financial Institutions to the IS Function

- Reduced product development/customization
- Standardized on fewer application systems
- Reduced maintenance expenditures
- Reduced internal DP staff
- Reduced use of outside consultants
- Consolidated networks and data centers
- Outsourced applications and/or operations

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Banking and Finance Marketplace Global IS Issues for the 1990s

- Re-engineering
- Outsourcing
- Data center consolidation/restructuring
- Downsizing
- Open systems/networking

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Key Topics Impacting the Banking and Finance Industry

- Banking industry demographics
- Bank profitability
- The S&L bailout
- Business restrictions and competition
- Overcapacity and mergers
- Outlook for regulatory reform
- The shifting credit card business
- Securitization
- Boundaries of the brokerage industry
- Nonbank financial services firms

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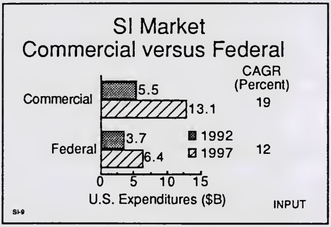

SI Market Commercial versus Federal

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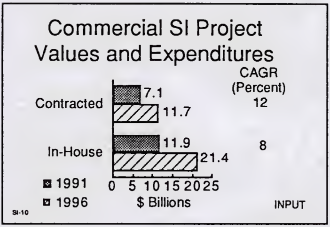
SI-9



Commercial SI Project Values and Expenditures

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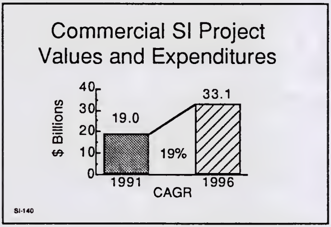
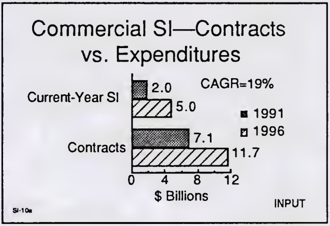
SI-10



Commercial SI Project Values and Expenditures

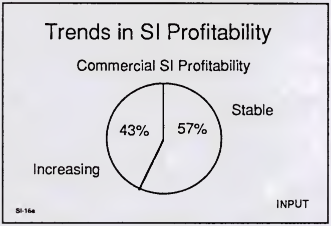
SI-140



Commercial SI—Contracts vs. Expenditures

INPUT

SI-10a

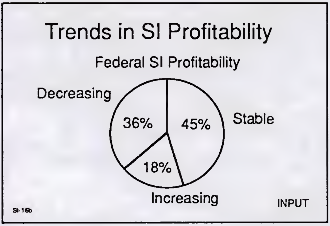


Trends in SI Profitability

Commercial SI Profitability

INPUT

SI-16a

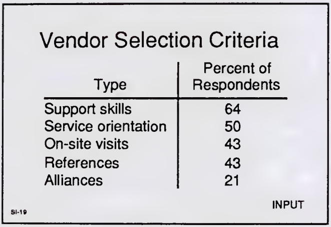


Trends in SI Profitability

Federal SI Profitability

INPUT

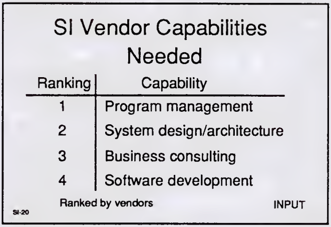
SI-16b



Vendor Selection Criteria

Type	Percent of Respondents
Support skills	64
Service orientation	50
On-site visits	43
References	43
Alliances	21

INPUT

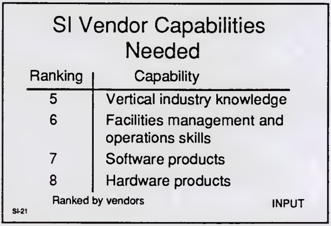


SI Vendor Capabilities Needed

Ranking	Capability
1	Program management
2	System design/architecture
3	Business consulting
4	Software development

Ranked by vendors

INPUT

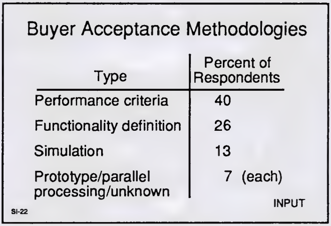


SI Vendor Capabilities Needed

Ranking	Capability
5	Vertical industry knowledge
6	Facilities management and operations skills
7	Software products
8	Hardware products

Ranked by vendors

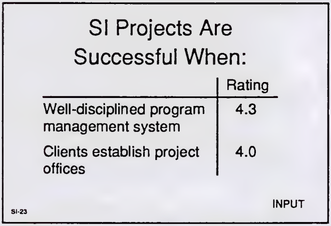
INPUT



Buyer Acceptance Methodologies

Type	Percent of Respondents
Performance criteria	40
Functionality definition	26
Simulation	13
Prototype/parallel processing/unknown	7 (each)

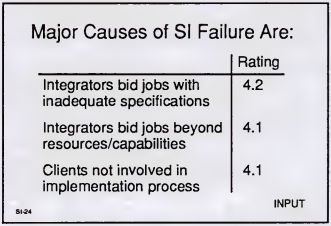
INPUT



SI Projects Are Successful When:

	Rating
Well-disciplined program management system	4.3
Clients establish project offices	4.0

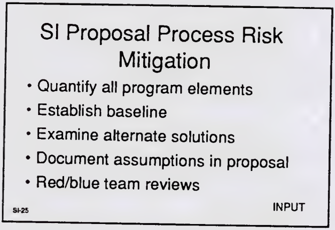
INPUT



Major Causes of SI Failure Are:

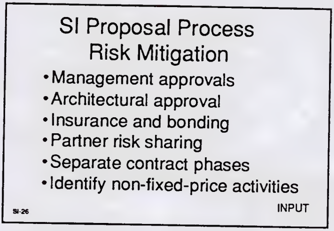
	Rating
Integrators bid jobs with inadequate specifications	4.2
Integrators bid jobs beyond resources/capabilities	4.1
Clients not involved in implementation process	4.1

INPUT



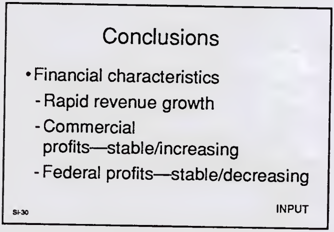
SI Proposal Process Risk Mitigation

- Quantify all program elements
- Establish baseline
- Examine alternate solutions
- Document assumptions in proposal
- Red/blue team reviews



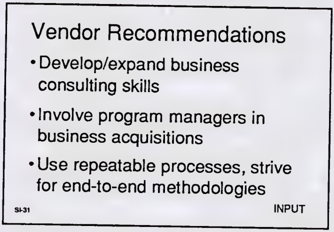
SI Proposal Process Risk Mitigation

- Management approvals
- Architectural approval
- Insurance and bonding
- Partner risk sharing
- Separate contract phases
- Identify non-fixed-price activities



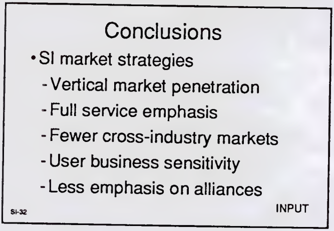
Conclusions

- Financial characteristics
  - Rapid revenue growth
  - Commercial profits—stable/increasing
  - Federal profits—stable/decreasing



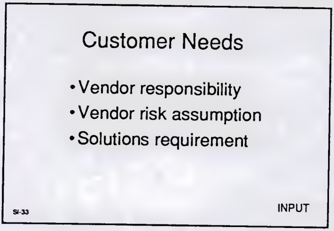
Vendor Recommendations

- Develop/expand business consulting skills
- Involve program managers in business acquisitions
- Use repeatable processes, strive for end-to-end methodologies



Conclusions

- SI market strategies
  - Vertical market penetration
  - Full service emphasis
  - Fewer cross-industry markets
  - User business sensitivity
  - Less emphasis on alliances



Customer Needs

- Vendor responsibility
- Vendor risk assumption
- Solutions requirement

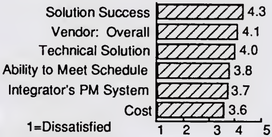
Market Factors

- Demand for connectivity
- Major infrastructure rebuilding
- User management trend
- Application complexity

SI-34

INPUT

Buyer/User Satisfaction



1=Dissatisfied
2=Very Satisfied

SI-35

INPUT

Overview

- Market forecasts
- Issues
- Markets
- Competition
- Trends

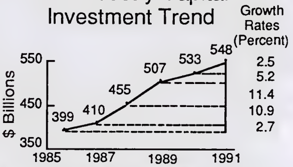
INPUT

Overview

- Market forecasts
- Issues
- Markets
- Competition
- Trends

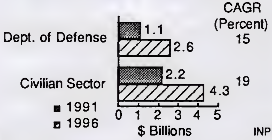
INPUT

U.S. Industry Capital Investment Trend



Source: Dec. 1990 Commerce Dept.

Civilian vs. DoD Federal SI Expenditures, 1991-1996



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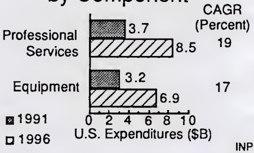
Systems Integration Market by Component



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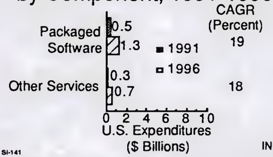
Systems Integration Market by Component, 1991-1996



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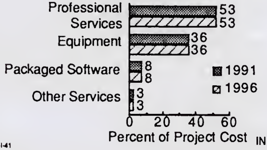
Trends in SI Project Composition



SI-41

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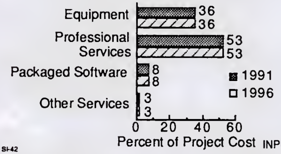
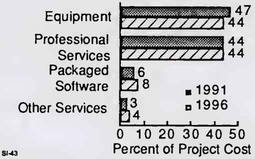
Component Group Expenditures Commercial, 1991-1996



SI-42

INPUT

Component Group Expenditures Federal, 1991-1996



SI-43

INPUT

Overview

- Market forecasts
- Issues
- Markets
- Competition
- Trends

SI-44

INPUT

Key Commercial SI Market Factors

- Positive
  - Global competitive pressures
  - Growing user/client involvement
  - Computer literacy

SI-45a

INPUT

Key Commercial SI Market Factors

- Positive
  - Major rebuilding of infrastructure
  - Growing complexity of applications
  - Rising demand for connectivity

SI-45b

INPUT

Key Commercial SI Market Factors

- Negative
  - Poor economy
  - Capital availability
  - Organizational instability
  - System maintenance concerns
  - "In-house" competitive threat

SI-46

INPUT

Key Federal SI Market Factors

- Positive
  - Productivity improvement demand
  - Shortage of technical staff
  - Commercialization

SI-47a

INPUT

Key Federal SI Market Factors

- Positive
  - Trend toward technology upgrades
  - Accountability
  - Software integration

SI-47b

INPUT

Key Federal SI Market Factors

- Negative
  - Budget constraints
  - "Grand Design" controversy
  - Vendor protest activity
  - GAO audits

SI-48

INPUT

Key Federal SI Market Factors

- Negative
  - Extended implementation schedules
  - Corporate information management initiative
  - Systems maintenance
  - Adversarial posture

SI-90

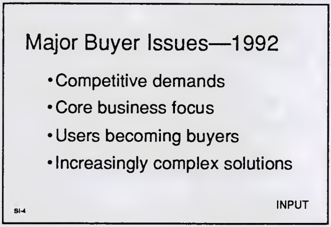
INPUT

Key Federal SI Market Factors

- Mixed impact
  - Deficit and budget
  - Changing priorities
  - More hardware/ less professional services
  - Fewer "mega" contracts

SI-162

INPUT

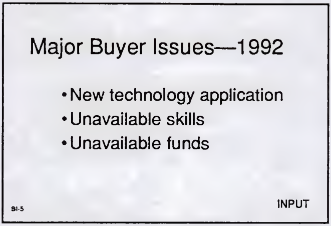


Major Buyer Issues—1992

- Competitive demands
- Core business focus
- Users becoming buyers
- Increasingly complex solutions

SI-4

INPUT

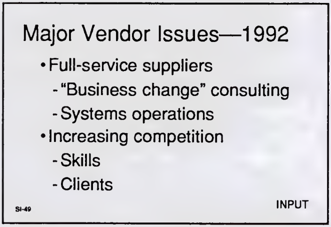


Major Buyer Issues—1992

- New technology application
- Unavailable skills
- Unavailable funds

SI-5

INPUT

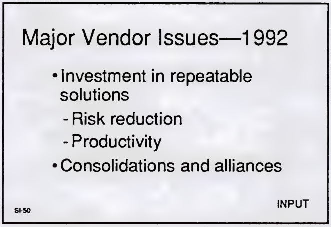


Major Vendor Issues—1992

- Full-service suppliers
  - "Business change" consulting
  - Systems operations
- Increasing competition
  - Skills
  - Clients

SI-49

INPUT

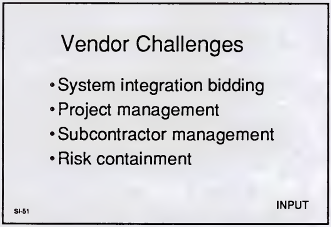


Major Vendor Issues—1992

- Investment in repeatable solutions
  - Risk reduction
  - Productivity
- Consolidations and alliances

SI-50

INPUT

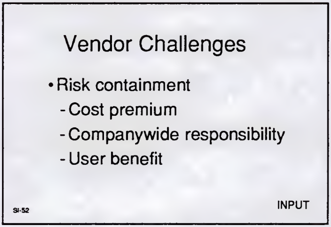


Vendor Challenges

- System integration bidding
- Project management
- Subcontractor management
- Risk containment

SI-51

INPUT



Vendor Challenges

- Risk containment
  - Cost premium
  - Companywide responsibility
  - User benefit

SI-52

INPUT

Overview

- Market forecasts
- Issues
- Markets
- Competition
- Trends

Recent SI Contracts

Vendor	Client
Digital	Aetna Life and Casualty - Client/server Toys R' Us - VAX server Alcan Aluminum - Plant information management system

Recent SI Contracts

Vendor	Client
EDS	Del Monte Foods - Upgrade hardware Chicago - Parking Authority Mitsubishi - Re-engineering Dentz-Diter (Spain) - CIM

Recent SI Contracts

Vendor	Client
Andersen	Dial Corp. - Manufacturing system Texas Utilities - Client/server MAXUS - CIM

Recent SI Contracts

Vendor	Client
IBM	Burroughs Wellcome - Plant automation Resolution Trust - Property management Walmart - Inventory control U.S. Courts - National network

Recent SI Contracts

Vendor	Client
Andersen	Hungarian State Railway Authority Budget Rent-A-Car Colonial Gas Kuwait Airlines

Recent SI Contracts

Vendor	Client
IBM Japan	Kansai International Airport - Passenger Information System

SI-92d

INPUT

Recent SI Contracts

Vendor	Client
EDS	General Electric Petroleos de Venezuela Kredietbank of Belgium

SI-92e

INPUT

Recent SI Contracts

Vendor	Client
Perot	McGraw-Hill - Publishing system Community Psychiatry Centers - Hardware upgrade NCNB - Data center

SI-93a

INPUT

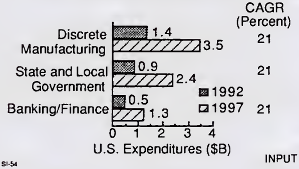
Recent SI Contracts

Vendor	Client
SHL Systemhouse	Los Angeles - Court system Maryland - State welfare system

SI-93b

INPUT

Expenditures by Industry



SI-54

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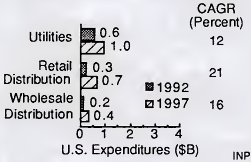
Expenditures by Industry



SI-55

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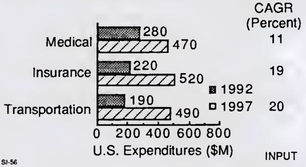
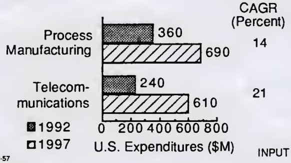
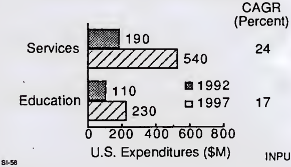
Expenditures by Industry



Expenditures by Industry



Expenditures by Industry



1991 SI Market Summary

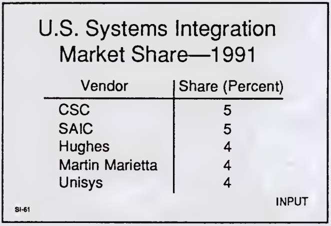
- Federal growth slower, large contracts available
- Commercial growth slower, smaller opportunities
- Economic conditions impacting market growth

Overview

- Market forecasts
- Issues
- Markets
- Competition
- Trends

U.S. Systems Integration Market Share—1992

Vendor	Share (Percent)
IBM	17
Andersen Consulting	9
EDS	8
Digital	7
CSC	5

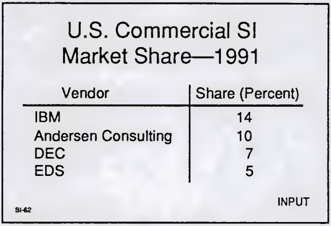


U.S. Systems Integration Market Share—1991

Vendor	Share (Percent)
CSC	5
SAIC	5
Hughes	4
Martin Marietta	4
Unisys	4

SI-61

INPUT

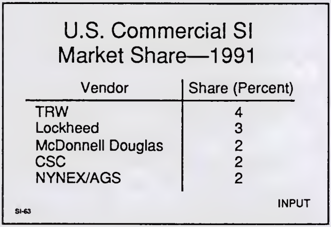


U.S. Commercial SI Market Share—1991

Vendor	Share (Percent)
IBM	14
Andersen Consulting	10
DEC	7
EDS	5

SI-62

INPUT

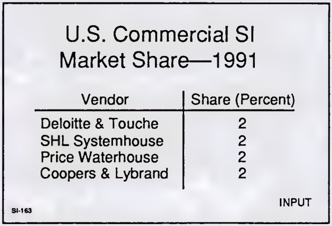


U.S. Commercial SI Market Share—1991

Vendor	Share (Percent)
TRW	4
Lockheed	3
McDonnell Douglas	2
CSC	2
NYNEX/AGS	2

SI-63

INPUT

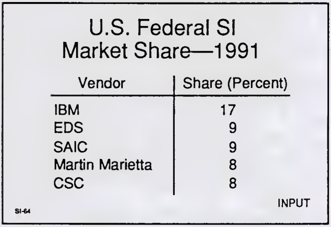


U.S. Commercial SI Market Share—1991

Vendor	Share (Percent)
Deloitte & Touche	2
SHL Systemhouse	2
Price Waterhouse	2
Coopers & Lybrand	2

SI-163

INPUT

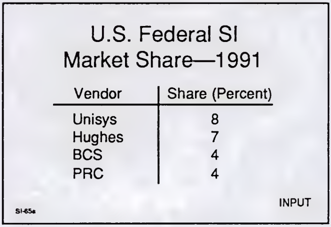


U.S. Federal SI Market Share—1991

Vendor	Share (Percent)
IBM	17
EDS	9
SAIC	9
Martin Marietta	8
CSC	8

SI-64

INPUT

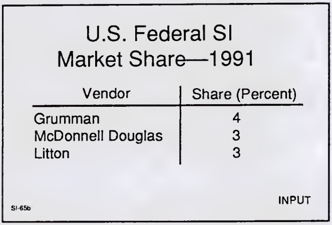


U.S. Federal SI Market Share—1991

Vendor	Share (Percent)
Unisys	8
Hughes	7
BCS	4
PRC	4

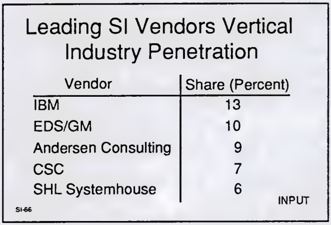
SI-65a

INPUT



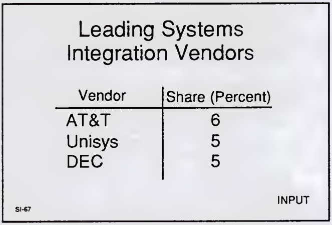
U.S. Federal SI Market Share—1991

Vendor	Share (Percent)
Grumman	4
McDonnell Douglas	3
Litton	3



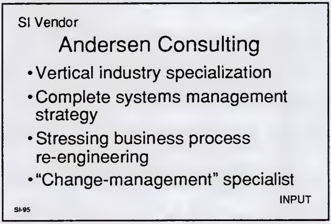
Leading SI Vendors Vertical Industry Penetration

Vendor	Share (Percent)
IBM	13
EDS/GM	10
Andersen Consulting	9
CSC	7
SHL Systemhouse	6



Leading Systems Integration Vendors

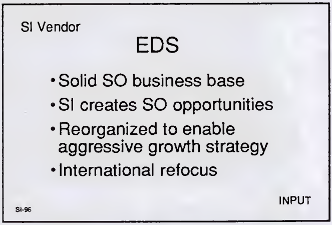
Vendor	Share (Percent)
AT&T	6
Unisys	5
DEC	5



SI Vendor

Andersen Consulting

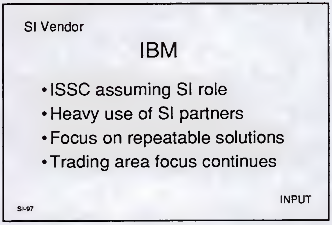
- Vertical industry specialization
- Complete systems management strategy
- Stressing business process re-engineering
- "Change-management" specialist



SI Vendor

EDS

- Solid SO business base
- SI creates SO opportunities
- Reorganized to enable aggressive growth strategy
- International refocus



SI Vendor

IBM

- ISSC assuming SI role
- Heavy use of SI partners
- Focus on repeatable solutions
- Trading area focus continues

Overview

- Market forecasts
- Issues
- Markets
- Competition
- Trends

INPUT

SI-68

Future Trends

- New domestic and off-shore competitors as primary and secondary vendors
- Increased centralization of vendor SI "product" management
- Increased development of program management methods

INPUT

SI-28

Future Trends

- Growing marketing/promotion investment
- Formal market strategy development by non-SI vendors
- Telecommunications and engineering companies

INPUT

SI-29

Trends

- SI market drivers
  - Business process emphasis
  - Short-term benefits expectation
  - Modular projects
  - Personnel constraints
  - Replicable solutions

INPUT

SI-69

Trends

- Customer emphasis
  - Users becoming buyers
  - Interest in solutions, not technology
  - Preference for industry knowledge
  - Project management key
  - Increased expectations

INPUT

SI-70

Trends: Vendor Directions

- Business/technology integration
- Organization re-engineering
- Increasing role of CASE
- Evolutionary solution

INPUT

SI-71a

Trends: Vendor Directions

- Hiring and training program managers
- Employment of risk management processes
- Variable use of alliances

Vendor Trends

- Increased competition
- Full-service offerings
- Increased role of business consulting
- More alliances

Vendor Trends

- Competition for program managers
- Federal vendors' failures in commercial market
- Solutions focus
- Decentralization of commercial implementation staffs

Recommendations

- Select targets and markets carefully
- Promote expertise in application areas
- Emphasize business/technology integration
- Manage alliances

Recommendations

- Plan for and manage risk
- Demonstrate project management skills
- Control business mix

SI Summary

- Service boundaries "blurring"
- SI is component of total system management service
- "Super vendor" growth continues
- Secondary vendors allying to participate

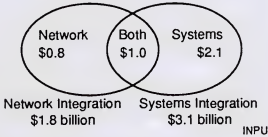
Network Integration

A Growing Opportunity

INPUT

SI-75

Non-Federal Network/SI Market, 1989



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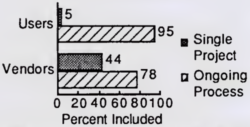
SI-14

Process versus Project Consideration



Data totals more than 100% due to multiple responses

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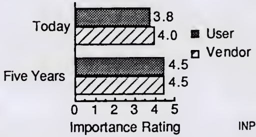
SI-76

Importance of Network Integration



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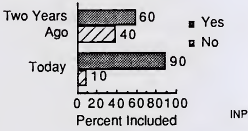
SI-77

Network Integration and Information Services Strategic Plan



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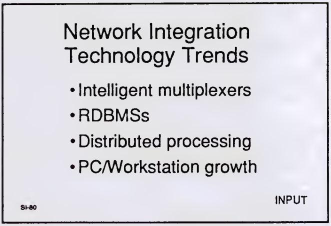
SI-78

Network Integration Technology Trends

- Robust public networks
- Virtual network capability
- Enhanced value-added networks
- Increased PBX functionality
- Enhanced local-area networks

INPUT

SI-79

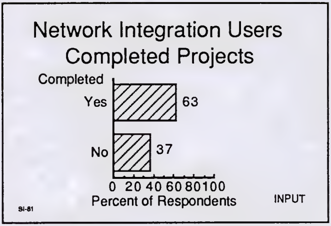


Network Integration Technology Trends

- Intelligent multiplexers
- RDBMSs
- Distributed processing
- PC/Workstation growth

SI-80

INPUT



Network Integration Users Completed Projects

SI-81

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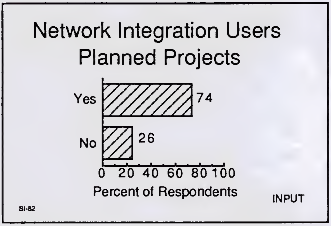
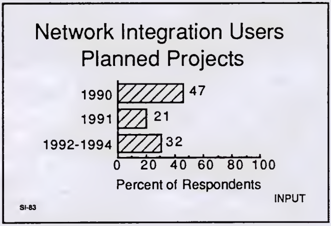


Network Integration Users Planned Projects

SI-82

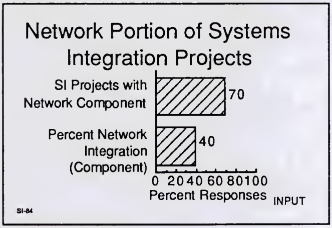
INPUT



Network Integration Users Planned Projects

SI-83

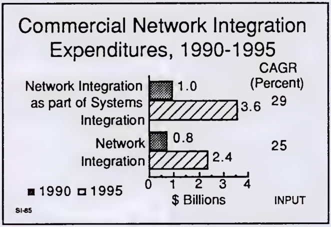
INPUT



Network Portion of Systems Integration Projects

SI-84

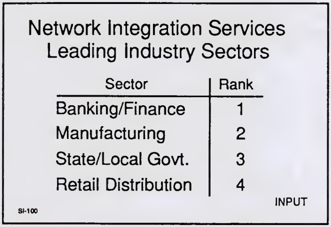
INPUT



Commercial Network Integration Expenditures, 1990-1995

SI-85

INPUT

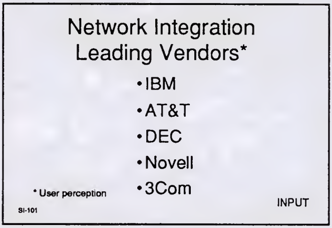


Network Integration Services Leading Industry Sectors

Sector	Rank
Banking/Finance	1
Manufacturing	2
State/Local Govt.	3
Retail Distribution	4

SI-100

INPUT



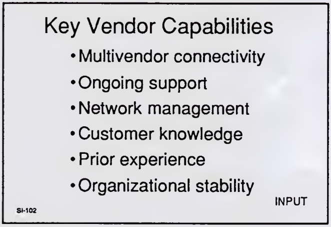
Network Integration Leading Vendors*

- IBM
- AT&T
- DEC
- Novell
- 3Com

* User perception

SI-101

INPUT

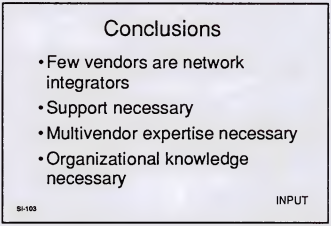


Key Vendor Capabilities

- Multivendor connectivity
- Ongoing support
- Network management
- Customer knowledge
- Prior experience
- Organizational stability

SI-102

INPUT

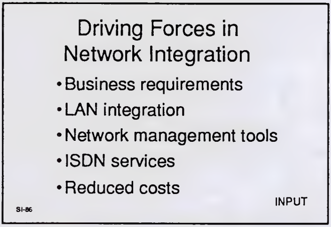


Conclusions

- Few vendors are network integrators
- Support necessary
- Multivendor expertise necessary
- Organizational knowledge necessary

SI-103

INPUT



Driving Forces in Network Integration

- Business requirements
- LAN integration
- Network management tools
- ISDN services
- Reduced costs

SI-86

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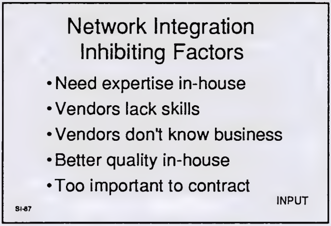


Network Integration Inhibiting Factors

- Need expertise in-house
- Vendors lack skills
- Vendors don't know business
- Better quality in-house
- Too important to contract

SI-87

INPUT

Conclusions

- Integrated networks important
- NI/SI labels not important
- Network integration a process
- Total integration not possible
- Local-area/office networks need integrating

SI-88 INPUT

Computer-Integrated Manufacturing and Systems Integration

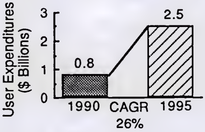
SI-104 INPUT

Forces Driving Change in Manufacturing Companies

- Global market
- Increased competition
- Technology
- Core business focus

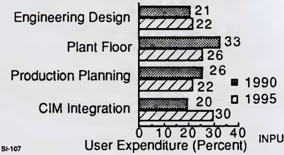
SI-105 INPUT

CIM Systems Integration Market, 1990-1995



SI-106 INPUT

CIM Systems Integration Spending Distribution



SI-107 INPUT

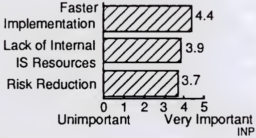
Leading CIM Systems Integration Vendors

Top Four

- Andersen Consulting
- Digital Equipment
- Electronic Data Systems
- IBM

SI-108 INPUT

Reasons for Using a CIM Integrator



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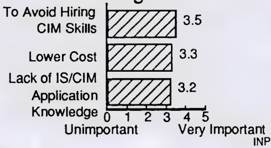
SI-109

Reasons for Using a CIM Integrator



INPUT

SI-110

CIM Systems Integration Summary and Conclusions

- CIM critical to manufacturer's competitiveness
- SI accelerates CIM implementation
- Near-term focus on CIM components

INPUT

SI-111

CIM Systems Integration Summary and Conclusions

- Longer term—Put it all together
- Largest single SI market
- No vendor has all the skills required

INPUT

SI-112

Systems Integration Electronic Imaging Market

SI-113 INPUT

Trends in Electronic Imaging Technology

- Product integration
- Input at point of origin
- Integration with processes
- Higher capacity
- More mainstream

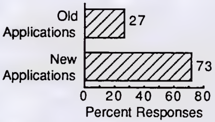
SI-114 INPUT

SI Electronic Image Justification

Reason	Rank
Improved customer service	1
Improved records management	2
Personnel savings	3
Media storage savings	4
Space savings	5

SI-115 INPUT

SI Image Processing—New Applications vs. Augmenting Old



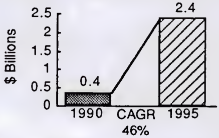
SI-116 INPUT

SI Implementation Approach by Industry—New vs. Old

Industry	Percent	
	New	Augment Old
Banking/finance	42	58
Insurance	27	73
Medical	15	85
Transportation	11	89
State/local govt.	10	90

SI-117 INPUT

SI Electronic Imaging Project Expenditures, 1990-1995



SI-124 INPUT

SI Electronic Imaging Driving Forces

- Business competition
- Decreasing system costs
- Increasing document management costs
- Productivity/quality
- Regulatory compliance

SI-125

INPUT

SI Electronic Imaging Inhibiting Factors

- System cost
- Lack of image awareness
- Lack of standards
- Work flow redesign
- Product improvements needed

INPUT

SI-126

SI Electronic Imaging Alliances

Type	Mentions
OEM purchase agreement	62
Project teaming	39
Professional services	39

INPUT

SI-127

SI Electronic Imaging Alliances

Type	Mentions
Value-added reseller	31
Cooperative marketing	15
Joint development	15
Information systems OEM	15

INPUT

SI-128

SI Imaging Vertical Market Coverage

Market	Percent of Vendors
Banking/finance	79
Federal government	64
Insurance	64

INPUT

SI-129

SI Imaging Vertical Market Coverage

Market	Percent of Vendors
State/local government	57
Medical	50
Transportation	29
Manufacturing	21

INPUT

SI-130

SI Imaging Vendor Qualifications

Qualification	User Ranking
Implementation experience	1
Proven architecture	2
Industry knowledge	2

INPUT

SI-131

SI Imaging Vendor Qualifications

Qualification	User Ranking
Application knowledge	4
Program management skills	5
Image software products	6
Image hardware products	7

INPUT

SI-132

Imaging Systems Integrators

Vendor	Percent User Responses
Andersen Consulting	62
TRW	39
Integrated Automation	31

INPUT

SI-133

Imaging Systems Integrators

Vendor	Percent User Responses
IBM	23
AMS	23
Wang	23
EDS	23

INPUT

SI-134

Imaging Systems Integrators

Vendor	Percent User Responses
Grumman	15
CSC	15
Xerox	8
Oracle	8

INPUT

SI-135

SI Electronic Imaging Conclusions

- Imaging not new
- System costs high
- Permanent storage solution

INPUT

SI-136

SI Electronic Imaging Conclusions

- Customer service motivation
- Standards necessary
- Applications not new
- Legal issue not solved

SI-137

INPUT

SI Electronic Imaging Recommendations

- Develop industry knowledge
- Build end-user relationships
- Provide increased education

SI-138

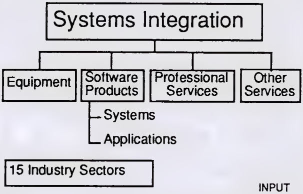
INPUT

SI Electronic Imaging Recommendations

- Understand document management process
- Build strong alliances
- Establish industry standards
- Address legal issues

SI-139

INPUT



SI-142

INPUT

1992 SI Reports

- SI Opportunities in Downsizing
- Networking SI Opportunities
- SI Opportunities in Re-engineering
- Impact of Outsourcing on SI

SI-143a

INPUT

1992 SI Reports

- Methods of Successful SI Projects
- SI Market Analysis, 1992-1997
- SI Vendor Competitive Analysis
- Regular Research Bulletins

SI-143b

INPUT

1992—SI Support

- SI seminar
- Hotline
- On-site presentation

1992 SI Program Focus

- Program/risk management
- Buyer practices/issues
- Integration in manufacturing

SI Project

EDS—Del Monte Foods

- 5 year—$30 million (estimate)
- Upgrade computer technology
- Customize packaged software
- Converted to outsourcing contract

SI Project

Andersen
Resolution Trust Corp.

- 4 year—$24 million
- Teamed with IBM
- Develop asset trading system
- Connects 2,000 offices in U.S.

DEC—Boeing

- 3 year—$54 million
- Install hardware/software
- Develop software
- Sheet metal fabrication
- Support for Boeing 777 development

SI Project

CSC—U.S. Postal Service

- 3 year—$33 million
- System design and development
- Data base development and support
- Nationwide system

SI Project

IBM—U.S. Federal Courts

- 5 year—$25 million
- Teamed with CSC
- Install communications network
- 2,000 LANs and electronic mail

INPUT

SI-150

SI Can Lead to Outsourcing

- Perot Systems
  - NCNB
    - 1990—Data center construction
    - 1991—10-year outsourcing

INPUT

SI-151a

SI Can Lead to Outsourcing

- Perot Systems
  - Robert Plan
    - 1990—Developed claims processing
    - 1991—5-year outsourcing

INPUT

SI-151b

SI Can Lead to Outsourcing

- Andersen
  - United Medicorp
    - 1989—Developed claim processing
    - 1991—Applications maintenance contract

INPUT

SI-151c

SI Can Lead to Outsourcing

- DEC
  - W.H. Smith
    - 1990—Design UK network
    - 1991—Manage UK network

INPUT

SI-151d

Systems Integration Program

Phases	Responsibilities
Needs analysis and requirements analysis	Vendor/ user
RFP/S.O.W. development	User
Vendor selection	User

Systems Integration Program

Phases	Responsibilities
Program development and integration	Vendor
Program testing	Vendor/user
Program acceptance	User
Operations and maintenance	Vendor/user

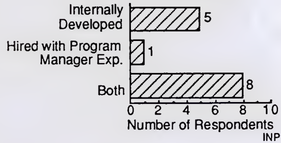
Common Lessons Learned

- Early end-user involvement
- Detailed specifications
- Incentive-based contracting
- Formal management processes

Relationship Guidelines

- Cultivate communication
- Expect and plan for change
- Develop a business-partner relationship

Development of Vendor Program Managers



Customer Program Manager Qualifications

Compared to Vendor's Program Manager	Percent of Respondents
Same	80
Different	13
Don't know	7

Customer Interface Changes During Contract Duration

Interface Remains the Same?	Percent of Respondents
Yes	47.0
No	53.0

SI-158

INPUT

Vendor Program Manager Training/Development Period

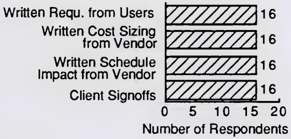
Method	Average Years of Training Required
Internally developed	6.1
Hired with experience	1.5

Note: Of the sample, 29% have formal, structured program manager training programs.

SI-159

INPUT

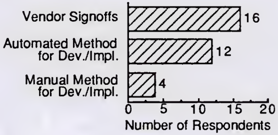
Change Mgmt. Components



SI-160

INPUT

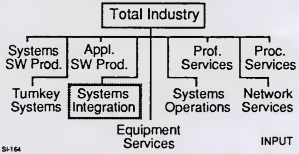
Change Mgmt. Components



SI-161

INPUT

Information Services Industry Structure


Total Industry

Systems SW Prod.

Appl. SW Prod.

Prof. Services

Proc. Services

Turnkey Systems

Systems Integration

Systems Operations

Network Services

Equipment Services

SI-164

INPUT

SI Market Definition

- Business offering
- Complete solution to complex requirements for
  - Information systems
  - Networks
  - Automation

SI-165

INPUT

10/20/92

SI Market Definition

- Custom selection and implementation of products and services

INPUT

Bus. Proc. Re-engr.

Bus. Proc. Re-design

Bus. Integration

Bus. Proc. Analysis

Enterprise Engineering

Core Proc. Re-design

Business Analysis

Transition Mgmt.

Change Management

Industrial Re-engr.

Operations Analysis

INPUT

Why Now?

- Historical watershed
- Enabling technologies
- Systems integration
- Revolution

INPUT

Interrelated

- Downsizing
- Networking
- Outsourcing
- Re-engineering

INPUT

Major Buyer Issues—1992

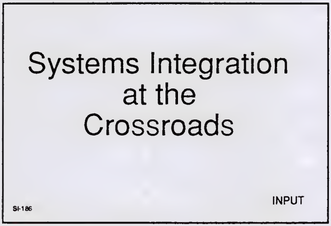
- The economy
- Core business focus
- Competitive demands
- Increasingly complex solutions
- New technology application
- Unavailable skills

INPUT

Client Motivation

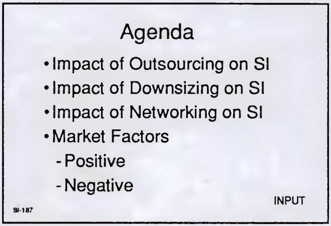
- Reduced cost
- Faster response
- Improved quality
- Competitive advantage

INPUT



Systems Integration at the Crossroads

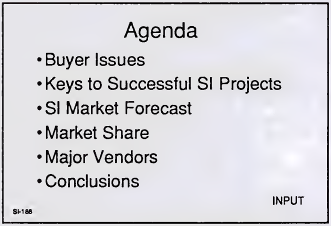
INPUT



Agenda

- Impact of Outsourcing on SI
- Impact of Downsizing on SI
- Impact of Networking on SI
- Market Factors
  - Positive
  - Negative

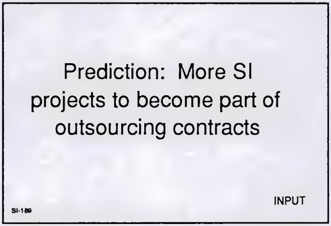
INPUT



Agenda

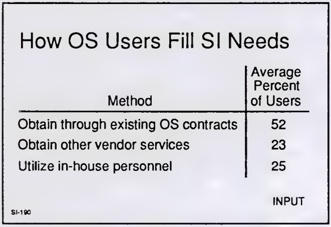
- Buyer Issues
- Keys to Successful SI Projects
- SI Market Forecast
- Market Share
- Major Vendors
- Conclusions

INPUT



Prediction: More SI projects to become part of outsourcing contracts

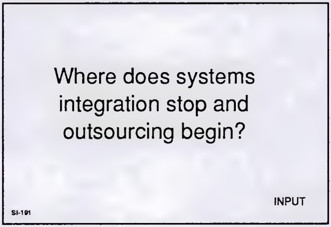
INPUT



How OS Users Fill SI Needs

Method	Average Percent of Users
Obtain through existing OS contracts	52
Obtain other vendor services	23
Utilize in-house personnel	25

INPUT



Where does systems integration stop and outsourcing begin?

INPUT

Outsourcing Agreements with SI Components

- Revlon/Andersen Consulting
  - Manage old platforms
  - Develop client/server applications
- Dial Corp./Andersen Consulting
  - Manage old platform
  - Develop client/server applications

INPUT

SI-192

Outsourcing Agreements with SI Components

- GE/EDS
  - Take over desktop services
  - Standardize to enhance client/server environment

INPUT

SI-193

SI Contracts Become Outsourcing Agreements

- Nations Bank/EDS
  - Built new data center
  - Operate data center
- Cummins Engine/EDS
  - Built new data center
  - Operate data center

INPUT

SI-194

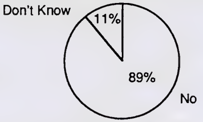
SI Contracts Become Outsourcing Agreements

- Del Monte Foods
  - Designed new system
  - Manage client/server environment

INPUT

SI-195

Less SI Opportunities Because of Outsourcing?



Percent of Respondents

INPUT

SI-177

SI Project Components Changing

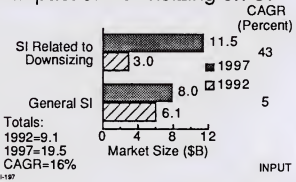
- Smaller projects
- Shorter duration
- Client/server component dominates
- Prototype often first stage

INPUT

SI-196

4/5/93

Impact of Downsizing on SI



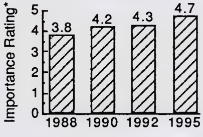
Totals:
1992=9.1
1997=19.5
CAGR=16%

SI-197 INPUT

Many current SI projects have networking component

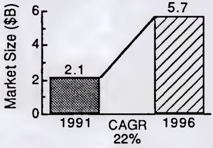
SI-198 INPUT

Importance of Networks to Business



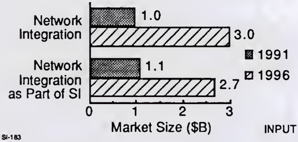
SI-199 INPUT

U.S. Commercial Network Integration Expenditures



SI-182 INPUT

Commercial Network Integration Expenditures



SI-183 INPUT

Positive Market Factors

- New technology emerging
- Lack of internal (client) expertise
- Vendor increasing global scope
- Telecommunication capabilities improving

SI-200 INPUT

U.S. Vendors

INPUT

SI-204

Vendor Market Share, 1991

Vendor	Revenue ($M)	Percent
IBM	1,750	17
Andersen Consulting	787 (1)(3)	8
EDS	770 (2)	8
Digital	565	6
Computer Sciences Corp.	478	5

INPUT

SI-181

Major Vendors and Strategies

Vendors	Strategies and Advantages
IBM/ISSC	Cost, integration, IBM system knowledge, credibility, full line of products/services

INPUT

SI-205

Major Vendors and Strategies

Vendors	Strategies and Advantages
Digital	Network application support, low cost and integration, multiple platform expertise

INPUT

SI-206

Major Vendors and Strategies

Vendors	Strategies and Advantages
Andersen Consulting	Focus on new business applications transition downsizing, years of diverse application experience, no hardware ties

INPUT

SI-207

Major Vendors and Strategies

Vendors	Strategies and Advantages
EDS	Cost effective, multiple platform expertise

INPUT

SI-208

Major Vendors and Strategies

Vendors	Strategies and Advantages
CSC	High level of technical support multiple platform expertise, good project management skills

Conclusions

- Systems Integration
  - Ranges from consulting to operations
  - Stimulated by business process re-engineering
  - Must provide global services

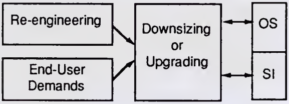
Conclusions

- Systems Integration
  - More impacted by client/server
  - Communications increasing factor
  - Vendors must manage carefully

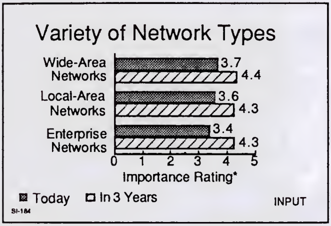
Impacts on SI

- Downsizing
- Globalization
- Outsourcing
- End user demands

Dynamics of Today's IS Efforts



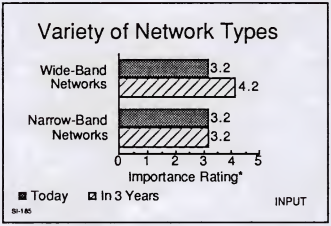
INPUT continues to find global networks increasing in importance



Variety of Network Types

INPUT

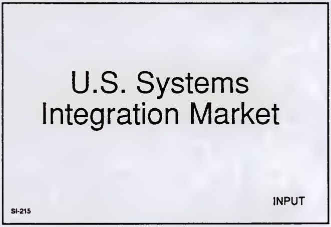
SI-184



Variety of Network Types

INPUT

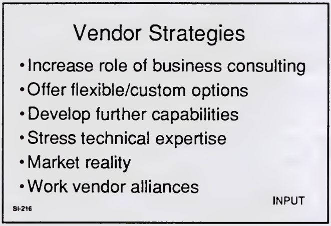
SI-185



U.S. Systems Integration Market

INPUT

SI-215

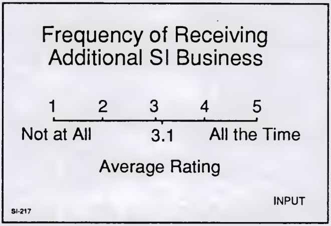


Vendor Strategies

- Increase role of business consulting
- Offer flexible/custom options
- Develop further capabilities
- Stress technical expertise
- Market reality
- Work vendor alliances

SI-216

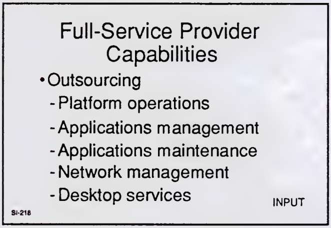
INPUT



Frequency of Receiving Additional SI Business

SI-217

INPUT

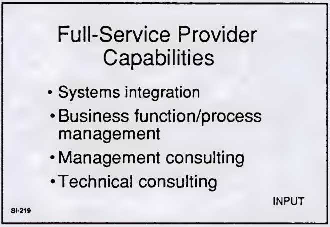


Full-Service Provider Capabilities

- Outsourcing
  - Platform operations
  - Applications management
  - Applications maintenance
  - Network management
  - Desktop services

SI-218

INPUT

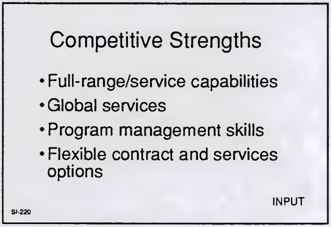


Full-Service Provider Capabilities

- Systems integration
- Business function/process management
- Management consulting
- Technical consulting

SI-219

INPUT

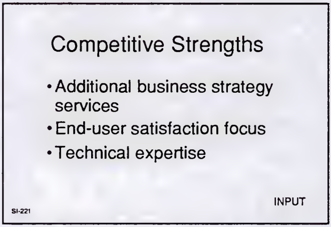


Competitive Strengths

- Full-range/service capabilities
- Global services
- Program management skills
- Flexible contract and services options

SI-220

INPUT



Competitive Strengths

- Additional business strategy services
- End-user satisfaction focus
- Technical expertise

SI-221

INPUT

Market Conditions

- Downsizing
- Business process re-engineering
- End-user involvement
- Customer emphasis
- Short-term benefit expectations
- More competition

INPUT

SI-222

Recommendations

- Focus on target market segments:
  - Where network systems can have impact
  - Where market presence/ experience can be leveraged
- Be a full service integrator

INPUT

SI-223

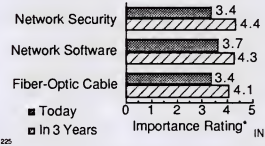
Recommendations

- Select relevant technologies and use as discriminators:
  - Network software
  - Fiber optics
  - Advanced mobile/wireless

INPUT

SI-224

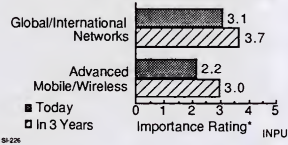
Elements of Network Integration Technology



INPUT

SI-225

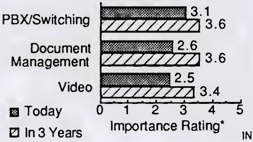
Elements of Network Integration Technology



INPUT

SI-226

Importance of Network Integration Applications



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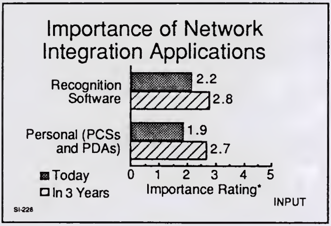
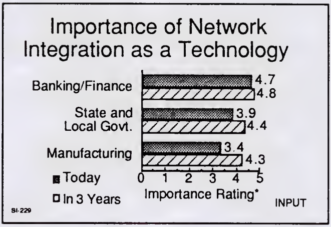
SI-227


Importance of Network Integration Applications


Importance of Network Integration as a Technology

SI Subcontracting

- To SI vendors
- To client integrators

Systems Integration

- Software and hardware/communications
- Vendor assumes responsibility
- Day-to-day vendor management

Client-Managed SI Projects

- Client sets schedules
- Major components assigned to internal staff
- IS responsible for results

Typical Internally Managed SI Projects

- Check image processing
- Conversion of ATM from Diebold to ANSI standard

Typical Internally Managed SI Projects

- Oracle-based order entry/inventory control system
- LAN installation
- Alumni development system

Percent Cost Distribution by Component

	Equipment	Packaged Software	Labor
Average	30	15	55
Range	5-60	1-30	25-85

User Viewpoint Summary

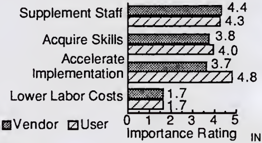
- Vendor reputation/contact important
- Cost savings minor factor
- Procurement not rigid
- Vendors vital to some projects

INPUT

Comparison User/Vendor Viewpoint

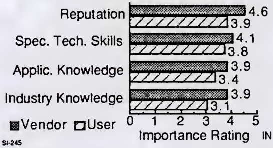
INPUT

Reasons for SI Subcontracting Vendor vs. User



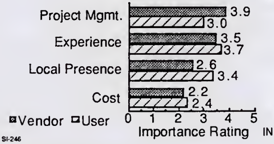
INPUT

Selection Criteria Vendor vs. User



INPUT

Selection Criteria Vendor vs. User



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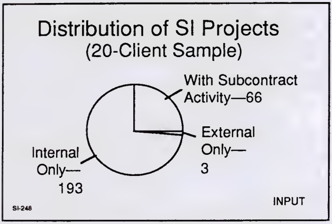
Secondary Market Potential

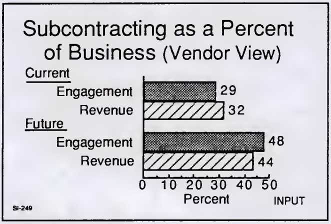
INPUT



Distribution of SI Projects
(20-Client Sample)

INPUT

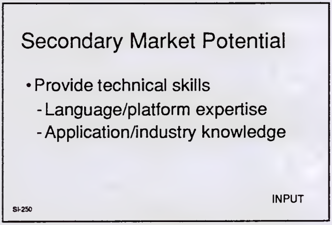
SI-248



Subcontracting as a Percent of Business (Vendor View)

INPUT

SI-249

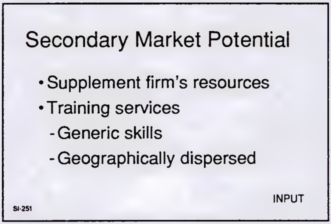


Secondary Market Potential

- Provide technical skills
  - Language/platform expertise
  - Application/industry knowledge

INPUT

SI-250

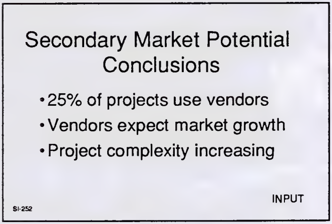


Secondary Market Potential

- Supplement firm's resources
- Training services
  - Generic skills
  - Geographically dispersed

INPUT

SI-251

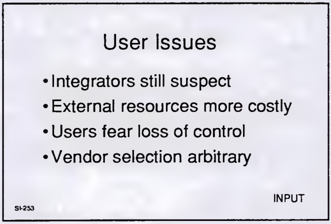


Secondary Market Potential Conclusions

- 25% of projects use vendors
- Vendors expect market growth
- Project complexity increasing

INPUT

SI-252

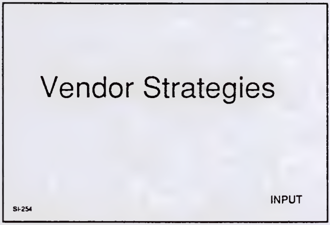


User Issues

- Integrators still suspect
- External resources more costly
- Users fear loss of control
- Vendor selection arbitrary

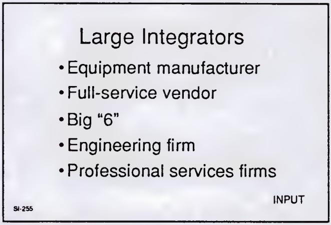
INPUT

SI-253



Vendor Strategies

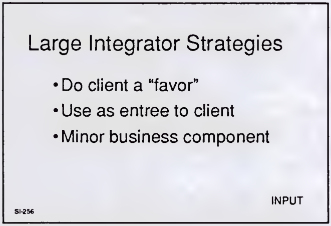
SI-254 INPUT



Large Integrators

- Equipment manufacturer
- Full-service vendor
- Big "6"
- Engineering firm
- Professional services firms

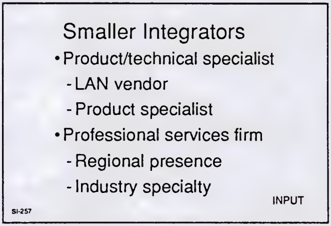
SI-255 INPUT



Large Integrator Strategies

- Do client a "favor"
- Use as entree to client
- Minor business component

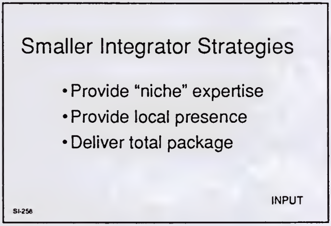
SI-256 INPUT



Smaller Integrators

- Product/technical specialist
  - LAN vendor
  - Product specialist
- Professional services firm
  - Regional presence
  - Industry specialty

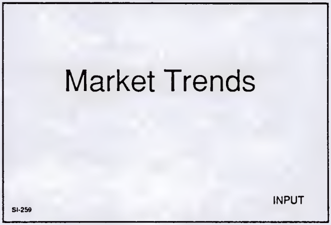
SI-257 INPUT



Smaller Integrator Strategies

- Provide "niche" expertise
- Provide local presence
- Deliver total package

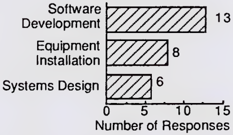
SI-258 INPUT



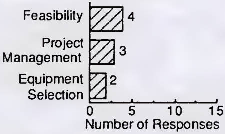
Market Trends

SI-259 INPUT

Potential Tasks to Subcontract



Potential Tasks to Subcontract



Market Trends

- Tightening budgets
- Continued initiation of projects
- Increasing complexity of projects

Recommendations

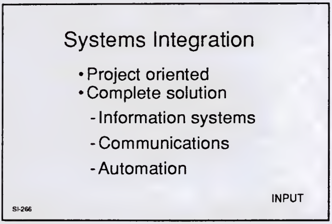
- Capitalize on technical "niches"
- Enhance national coverage
- Build on existing relationships

Typical SI Project Tasks

- Systems design
- Selection/configuration of equipment and network
- Selection/development of applications software
- Installation of equipment and software

Systems Integration

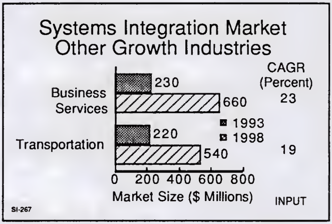
- Customized products
  - Selection
  - Implementation



Systems Integration

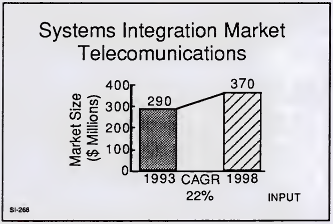
- Project oriented
- Complete solution
  - Information systems
  - Communications
  - Automation

INPUT



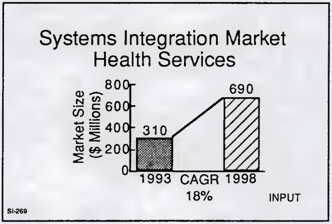
Systems Integration Market
Other Growth Industries

INPUT



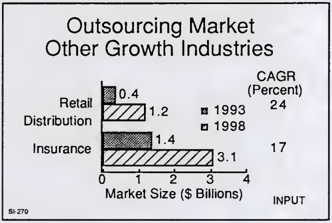
Systems Integration Market
Telecomunications

INPUT



Systems Integration Market
Health Services

INPUT



Outsourcing Market
Other Growth Industries

INPUT

Negative Market Factors

- Rapid technology changes confuse client
- Decision process moves to functional managers
- Vendors need vertical industry expertise

INPUT

SI-201

Buyer Issues

- Want to concentrate on business basics
- Need to use technology competitively
- Need solutions immediately
- Must experience short-term financial gains

INPUT

SI-202

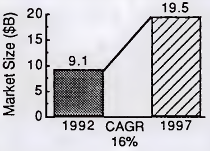
Keys to Successful SI Projects

- Good project management
- Knowledge of client's business
- Open communication between vendor/client
- Structured project review process
- Risk management controls in place

INPUT

SI-203

Systems Integration Market



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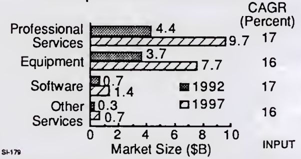
SI-178

Systems Integration Market Component Forecast



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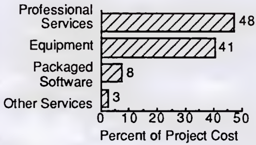
SI-179

1992 SI Project Composition



INPUT

SI-180

Vendors' Motivation

- High value
- Early involvement
- SI opportunities
- Build expertise

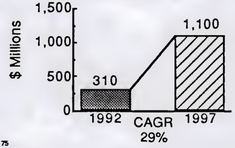
Challenges

- Price
- In-house IS
- Culture
- Resistance to change

Examples

- IBM Canada
- Mutual Benefit Life
- United Stationers
- Lee Memorial Hospital

Business Process Re-engineering



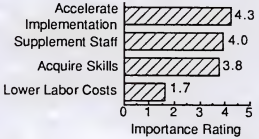
Vendor Recommendations

- Use BPR internally
- Emphasize vertical markets
- Develop methodologies
- Focus on technology

User Viewpoint

INPUT

Reasons for Subcontracting



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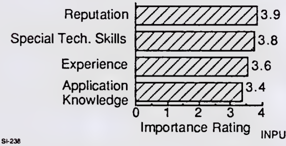
Vendor Subcontractor Selection Criteria



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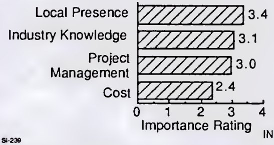
Vendor Subcontractor Selection Criteria



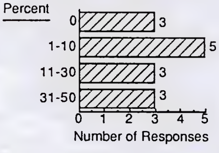
INPUT

Procurement Approaches

Item	No. of Resp.
Issued RFPs or RFBs	5
Previous IS contact/ experience with vendor	5
Vendor recommended by user department	3

INPUT

Distribution of Subcontracted SI Expenditures



INPUT

Systems Integration

SI-1

INPUT

SI Definition

- Vendor-provided service
- Complete solution to complex requirement for:
  - Information systems
  - Networking
  - Automation

SI-2a

INPUT

SI Definition

- Custom selection and implementation of products and services

SI-2b

INPUT

Systems Integration: Globalized Activity

- Gaining overseas acceptance
- Prime contractors need local subcontractor relationships

SI-3a

INPUT

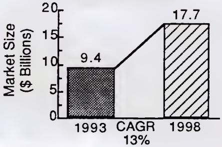
Systems Integration: Globalized Activity

- Big players with deep pockets and high visibility required
- Leads to systems operations (facilities management) contracts

SI-3b

INPUT

Systems Integration Market 1993-1998



SI-8

INPUT

9/29/92

VENDOR SELECTION CRITERIA: COMMERCIAL CUSTOMERS

Type	Frequency of Use* (Percent)
Industry Experience	86
Application Knowledge	86
Cost/Performance	86
SI Experience	79
Project Management Skills	64
Support Skills	64
Service Orientation	50
On-Site Visits	43
References	43
Alliances	21

* Multiple responses permitted.

?

TRW PROFILE

Factor	ISG	IS&S
Technical	UNIX Signal Processing Complex SI/ Project Mgt. SW Engineering Methodologies/ Rapid Proto Expert Systems Computer Security Fault Tolerant Systems	Imaging Software and Equipment Data Bases Specialized Networks
Applications	GIS Hazardous Waste Disposal Bi-Lingual IS	Financial Transactions Document Handling Credit Marketing Data Bases
Customer types	DOD	Financial Sector Credit Grantors Real Estate
Cost Structure	Above Average	Average (?)

Social Hour/Cocktails
5:30-7:30 pm Wednesday
Park Patio Cafe (Building S)

PARTNERING

- **Acquisition of applications knowledge**
- **Tactical versus strategic**
  - **Short-term, individual opportunities**
  - **Long-term, complementary**

TRW Information Technology
Symposium
October 20, 1993

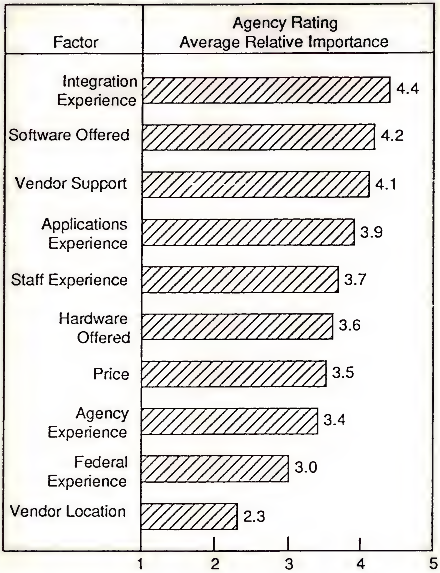
Slot	Time	Topic	Presenter
	8:30	Kick-off	Ron Sugar
1	8:45	Automated Identification Systems	Alex Gillies
2	9:15	Electronic Data Interchange	Alex Gillies
3	9:45	I-CASE Methodology and Tools	Mike Springman
	10:15	Break	
4	10:30	Client Server Architectures	Cort Klein
5	11:00	Text Management	BK Richard
6	11:30	Office Automation	Pamela Lentz
	12:00	Lunch	
7	1:15	Automotive Information System	Tom Zimmerman
8	1:45	Transportation Information Systems	Bill Kincaid
9	2:15	Electronic Document Management	Norm Mejstrik
	2:45	Break	
10	3:00	Geographic Information System	John Baleja
11	3:30	Image Perspective Transformation (including video)	Gary Gnauck
12	4:00	Personal Security Systems	Bob Marth
13	4:30	Info Site/Info Quest	Diane Webb/ Dave Kay
14	5:00	Copernicus	Ann Delligatta
	5:30	Social Hour/Cocktails	Park Patio Cafe (Building S)

TRW Information Technology Symposium
October 21, 1993

Slot	Time	Topic	Presenter
15	8:30	Telecommunication Services	Al Zacharias
16	9:00	Advanced Recognition Technologies	David Aragon
17	9:30	High Volume Object-Oriented Transaction Processing	John Lynch
	10:00	Break	
18a	10:15	S&EG Overview - Communications Satellites and Payloads	John Mellen
18b	10:25	Commercial Telecommunications Services - TDRS Transponders and PacifiCom	Joe Del Riego
19	10:45	Odyssey/Personal Communications Services	Mike Horstein
20	11:15	High Performance Networks (ATM Switch)	Kevin Wirick
21a	11:45	Mass Data Storage (Ramcube)	Tom Gritzmacher
21b	12:00	Superconducting Electronics for Telecommunications	Arnold Silver
	12:15	Adjourn	

Social Hour/Cocktails
5:30-7:30 pm Wednesday
Park Patio Cafe (Building S)

Federal SI Criteria



Low High

Systems Integration Vendor Examples by Class

Class	Examples
Hardware manufacturers	Digital, Hewlett-Packard, IBM, Motorola, NCR/AT&T, Unisys
Communications companies	AT&T, Contel, GTE, Regional Bell Operating Companies
Professional services companies	
• Consulting-based	Andersen Consulting, Booz-Allen & Hamilton, Coopers & Lybrand, Deloitte & Touche, Ernst & Young, KPMG Peat Marwick, McKinsey, Price Waterhouse
• IS professional services	American Management Systems (AMS), CAP Gemini, CSC, Computer Task Group (CTG), SAIC, SHL Systemhouse
Systems operations	EDS, Litton, Systems and Computer Technology (SCT), ISM Corporation, Systematics
Aerospace companies	Boeing Computer Services (BCS), Hughes/GM, Litton Computer Services (LCS), McDonnell Douglas, Martin Marietta, TRW
Software suppliers	Microsoft, Novell, Oracle, Sterling Software
Other	Bechtel, Covia, Deere Technology

SI Market Entry Options

- **Partnering**
- **Joint Venture**
- **Acquisition**

TRW Presentation

October 22, 1993
Thomas O'Flaherty
Robert Goodwin

- Overview of U.S. Information Services Business
    - Definitions
    - Service delivery mechanisms
    - Vertical markets
        - Financial services/credit data
    - Market size, growth, trends

- Systems Integration
    - Drivers
    - Structure of business
    - Relation of SI to other delivery mechanisms
    - Business/competitive environment

- Communications Markets
    - Overview
    - Trends
    - Relation to SI and other offerings

- Discussion

VI. FEE

The professional fee for the study will be $72,000. One-half of this fee ($36,000) is due and payable upon authorization. The remainder of the professional fee plus out-of-pocket expenses is due upon the submission of the final report or presentation. Out-of-pocket expenses primarily include travel, telephone, and report preparation will be charged at cost.

At TRW's request, the work has been further broken out into four functional units and the professional fee priced accordingly. The sum of the individual units is more than the professional fee for the entire project because of efficiencies when the project is planned and perform simultaneously. Because of the fast track nature of the assignment, INPUT does not believe that it is practical to perform functional units of work sequentially.

Function Unit of Work		Associated Professional Fee
A.	Market overview preparation and presentation	$8,000
B.	Analysis of internal capabilities and expansion to adjacent markets	$21,000
C.	In-depth competitive analysis of eight competitors	$25,000
D.	Scenario analysis and final report	$25,000

Note: If "D" is elected without "B" or "C", INPUT may choose to further define the areas of "Scope" which it will be responsible for.

The above figures are for the professional fee only. Reasonable documented out-of-pocket expenses will be charged for work in each functional unit.

TRW may authorize the study by signing below.

****
*** ACTIVITY REPORT ***
****

TRANSMISSION OK

TX/RX NO.	8078
CONNECTION TEL	1 415 854 0107
CONNECTION ID	PAC HOME
START TIME	12/06 10:57
USAGE TIME	13'11
PAGES	16
RESULT	OK

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IT Intelligence Services

400 Frank W. Burr Blvd.
Teaneck, NJ 07666
Tel. (201) 801-0050
Fax (201) 801-0441

FAX TRANSMITTAL FORM

Date: Dec 6

To: Name: PAC c ~~Bob Goo~~

Tel./Location:

Co.:

Fax No:

From: Name: TCP

Subject: TRW Status

Confidential: ~~Y~~ / N

Urgent: [✓ Y] / N

Page: 1 of 16

File: Chron
Contact
Other:

ADM 341/05 8/93

Dec 3

To: PAC cc. Bob G

Fm: TOF

Re: TRW Status

At TRW's request (and for a $3,500 fee) I attended their Information Technology Symposium on Oct 20 and 21 where people from different parts of TRW gave short summaries of their capabilities. Attached is the program list and my report to Ron Sugar. This should be self-explanatory.

Bob and I gave a joint presentation on Oct 22, basically a customized client presentation; agenda attached. Members of the task force PAC and I met with were there as well as about a dozen other planners and managers. It was quite interactive and seemed to go well.

As previously reported, I had a side conversation with Phil Papaccio about Cap Gemini (with whom they have been having conversations). I expanded on our public comments and said that Cap Gemini had a problem in bringing together their high level consultants they had acquired (United Research and MAC Group) with their essentially body shop CGA. [Confirmed subsequently from other sources.] Cap Gemini, at least in the U.S.,does not really have SI capabilities, in the way the INPUT and TRW would define them. Phil found this analysis useful.

Bob and I agreed that he would be the point of followup contact with TRW on both the program and, for the time being, the custom status.

As a result of my time with TRW I have the following observations:

- They aren't at all sure where they are going (said by several people to me)
- They are quite unsure as to the best analytic/planning way to form their options; both their own sketch of what they wanted and our proposal have not seemed to trigger "must do" responses.
- TRW may view INPUT as market analysts rather than strategic thinkers; this appears to be as much an image issue as a substance issue

They have spent a total of $11,500 on work to date; our proposal quoted $72,000 (summary attached).

TRW Information Technology
Symposium
October 20, 1993

Slot	Time	Topic	Presenter
	8:30	Kick-off	Ron Sugar
1	8:45	Automated Identification Systems	Alex Gillies
2	9:15	Electronic Data Interchange	Alex Gillies
3	9:45	I-CASE Methodology and Tools	Mike Springman
	10:15	Break	
4	10:30	Client Server Architectures	Cort Klein
5	11:00	Text Management	BK Richard
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TRW Information Technology Symposium
October 21, 1993

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15	8:30	Telecommunication Services	Al Zacharias
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17	9:30	High Volume Object-Oriented Transaction Processing	John Lynch
	10:00	Break	
18a	10:15	S&EG Overview - Communications Satellites and Payloads	John Mellen
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21b	12:00	Superconducting Electronics for Telecommunications	Arnold Silver
	12:15	Adjourn	

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IT Intelligence Services

1881 Landings Drive
Mountain View, CA 94043-0848
Tel. (415) 961-3300
Fax (415) 961-3966

November 4, 1993

Dr. Ronald Sugar
TRW
Space Park
Redondo Beach, CA 90278

Via fax 310-813-2412

Dear Ron:

Attached is INPUT's preliminary assessment of the technologies which were presented at the Technology Forum. Obviously, there is only so far that this sort of analysis can go, given the limitations in time and format.

By the way, I thought that the presentations and presenters were excellent overall.

As I discussed with several people from TRW at the time, this is one case where there undoubtedly would be synergies if some of the technology groups worked more closely together. But I understand that within the historic TRW culture this is sometimes easier said than done,

If you have any questions or comments, please call me. I will be back in my own office on Monday (201-801-0050).

Sincerely,

Thomas O'Flaherty
Vice President

FRANKFURT • LONDON • NEW YORK • PARIS • SAN FRANCISCO • TOKYO • WASHINGTON, D.C.

PRELIMINARY ASSESSMENT OF TRW TECHNOLOGY

I. BACKGROUND

INPUT attended TRW's technology overview presentation on October 21 and 23, 1993 where 21 presentations were made on technology capabilities.

This report summarizes INPUT's initial assessments of these technologies. INPUT's assessments are based on the following:

- Statements, data and analysis presented by TRW.
- Prior research conducted by INPUT in these product and market areas
- INPUT staff knowledge in these technology and market areas

Each technology area was evaluated against the factors described in section II the results of the assessments are shown in the attached series of exhibits.

The evaluations were based on INPUT's current understanding. In some cases, INPUT would require additional information for a complete assessment (these are noted by "?" in the appropriate cell). However, in most cases INPUT has had enough information to provide at least a preliminary assessment.

II. ASSESSMENT CRITERIA

The following factors were used to assess the technologies presented. These assessments are all necessarily tentative and include many implicit assumptions. More complete assessments would be dependent on

- A deeper understanding of the offerings along with other supporting or associated technologies.
- In some cases, additional market research.

Overall Technolgy

Each technology has been classified into one of the following categories:

- o General capability, i.e., the technology capability is a general one that does not appear to give TRW a competitive advantage.
- o Leading edge, i.e., TRW appears to be among the leaders
- o Unique, i.e., TRW appears to have a unique position

Market Issues

Market issues are important determinants as to the likely success of an offering. The pertinent market issues are

- o How significant is the commercial opportunity? This assessment represents a combination of market size, growth and the competitive environment. This is a broad-brush assessment and will have to further quantified and analyzed.
- o Is there a critical time window?
- o What is the relative level of ongoing investment, either to complete the offer and/or to retain the technological position. This ranges from a "low" level of investment ($100,000 or less), to "very high", in the tens of millions or more.
- o What is the relative level of risk? Risk is a combination of technical risk (Will the offeering work?} and market risk (Will there be enough buyers?)
- o Are there significant TRW resource constraints? If there are resource constraints, these are generally a limited number of skilled people available.

Note: Assessments are either yes/no or low (L), low/medium (L/M), medium (M), medium/high (M/H), high (H) or very high (VH). These assessments are judgmental and can later be refined and quantified if additional information becomes available and additional analysis is performed. However, INPUT believes that these assessments represent a useful point of departure for more in-depth analysis.

Delivery Alternatives

Based on the discussions at the presentation, the technologies can be delivered as

- A service (e.g., Odyssey)
- Know-how (i.e, via consulting)
- One or more products (as in text management)
- Systems integration (or as a component of SI)

Delivering know-how is often subject to resource (people) bottlenecks. TRW is probably not well-positioned to market and service some products (e.g., software. SI-based services will usually provide the largest amount of leverage. Since many of the SI-opportunities will be in the commercial market, TRW may have to partner, at least initially, with established SI firms to be the most effective in commercial markets.

Technology

In the course of the analysis, the technologies presented were noted; these weere classified into the following categories:

- Imaging
- Identification
- Data/test management
- Communications
- Other (four technologies in whole or part)

Imaging, data/text management and communications are already complementary technologies and will, arguably, being even more closely related in the future.

It became clear that within particular technology areas that there was considerable overlap in activities. INPUT believes that at least some of the acitivities in, for example, imaging and text/data management, would benefit be being much more closely coordinated and, possibly, combined. It is not possible on the information provided to make any stronger statements now in this regard.

Linkage to Other TRW Technologies

While there was overlap between many of the technologies (e.g., across imaging), some links appear tighter than others. These are noted in the exhibit.

Preliminary Assessment of TRW Technologies

Factor	1. Automated ID Systems	2. EDI	3. I-CASE Meth.	4. C/S Arch.	5. Text Mgt.	6. OA	7. Automotive Info. Sys.
Overall Technology							
• General Capability		X	X	X		X	
• Leading Edge	X						X
• Unique					X		
Market Issues							
• Commercial Opportunity	M	N/A	N/A	N/A	M	L	H
• Critical Time Window	No	No	No	Yes	No	No	Yes
• Level of Ongoing Investment	?	M	M	M/H	M/H	L	H
• Level of Risk	M	N/A	N/A	N/A	M	N/A	M
• Resource Constraint	No	Yes	Yes	Yes	Yes	Yes	?
Delivery Alternatives							
• Service					X		
• Know-how		X	X	X	X		
• Product					X		X
• SI	X	X		X	X	X	X
Technology							
• Imaging	X				X	X	
• Identification	X				X	X	
• Data/Text Mgt					X	X	
• Communications		X		X		X	X
• Other			X				X
Linkage to other TRW Technologies (Presentation #)				6	6,8	5,8	8

Preliminary Assessment of TRW Technologies

Factor	8. Transportation Info. Sys.	9. Elec, Doc. Mgt.	10. GIS	11. Image Perspective Transformation	12. Personal Sec. Sys.
Overall Technology					
• General Capability					
• Leading Edge	X	X	X		X
• Unique				X	
Market Issues					
• Commercial Opportunity	L/M	M	M	L/M	M
• Critical Time Window	Yes	No	No	Yes ?	Yes ?
• Level of Ongoing Investment	M/H	M	M	M	M
• Level of Risk	H	M	H	M/H	M/H
• Resource Constraint	?	Yes	Yes	Yes	?
Delivery Alternatives					
• Service		X	X	X	
• Know-how	X	X	X	X	
• Product				X	
• SI	X	X	X	X	X
Technology					
• Imaging	X	X	X	X	X
• Identification		X		X	X
• Data/Text Mgt.		X	X	X	X
• Communications	X	X	X		X
• Other					
Linkage to other TRW Technologies (Presentation #)	7	5, 6	11	10	

Preliminary Assessment of TRW Technologies

Factor	13a. InfoSite	13b. Info Quest	14. Copernicus	15. Telecom Svcs.	16. Recognition Technology
Overall Technology					
• General Capability	X		X	X	
• Leading Edge		X			X
• Unique					
Market Issues					
• Commercial Opportunity	M	L	M?	H	H
• Critical Time Window	No	?	?	No	Yes
• Level of Ongoing Investment	L	H?	H	L	M/H
• Level of Risk	L	M	M	L	M/H
• Resource Constraint	No	Yes	No	No	Yes
Delivery Alternatives					
• Service		X		X	X
• Know-how	X	X		X	X
• Product	X		X		X
• SI	X	X		X	X
Technology					
• Imaging					X
• Identification			X		X
• Data/Text Mgt.	X	X	X		X
• Communications			X	X	X
• Other					
Linkage to other TRW Technologies (Presentation #)	9, 13b	9, 13a		N/A	14, 17

Preliminary Assessment of TRW Technologies

Factor	17. High Vol. 00TP	18b. TDRS Transponders, PacifiCom	19. Odyssey	20. ATM Switch
Overall Technology				
• General Capability				
• Leading Edge	X	X		X
• Unique			X	
Market Issues				
• Commercial Opportunity	M/H	M	L?	M
• Critical Time Window	No	Yes	Yes	Yes
• Level of Ongoing Investment	M	H?	VH	H
• Level of Risk	M	H	H	H
• Resource Constraint	Yes	Yes	Yes	?
Delivery Alternatives				
• Service	X	X	X	
• Know-how	X			X
• Product				X
• SI	X			
Technology				
• Imaging	X			
• Identification	X			
• Data/Text Mgt.	X			
• Communications	X	X	X	X
• Other				
Linkage to other TRW Technologies (Presentation #)	16	19	18b	

Preliminary Assessment of TRW Technologies

Factor	21b. Superconducting Electronics	21a. Ramcube
Overall Technology		
• General Capability		
• Leading Edge	X?	X
• Unique		
Market Issues		
• Commercial Opportunity	L	M
• Critical Time Window	Yes?	Yes
• Level of Ongoing Investment	?	L
• Level of Risk	H?	H
• Resource Constraint	Yes?	No
Delivery Alternatives		
• Service		
• Know-how	X	
• Product	?	X
• SI	?	
Technology		
• Imaging		
• Identification		
• Data/Text Mgt.		
• Communications	X	
• Other	X	X
Linkage to other TRW Technologies (Presentation #)		

Banking and Finance Industry Drivers

Driver	Issues
Profitability	• Great improvement, still a priority • Outsourcing: technical, business
Restructuring of operations	• A factor in other drivers • "Business process re-engineering" a catch-phrase, rather than driver • Outsourcing
Competition from non-banks and "virtual banks"	• Long term issue • Electronic commerce
Mergers (pre and post)	• A long term factor on systems

Banking and Finance Industry Drivers
(Continued)

Driver	Issues
Trading	• New systems investments have plateaued; incremental change • "Pattern recognition" next breakthrough?
Loan management/ credit	• Business process re-engineering • Ongoing systems impact
New products	• Cautious expansion • Large "electronic" component
Niche focus	• Increasingly important • Linked to new products

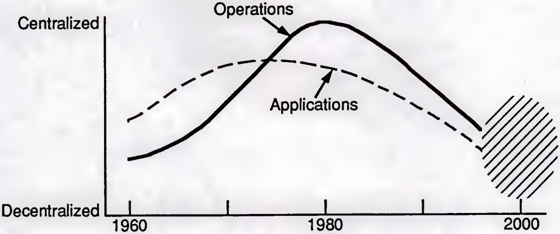
Leading On-Line Data Base Vendor Market Focus

Company	Credit Information	Securities Prices	Vertical Specialty	Business Information
Dun & Bradstreet	X	-	-	X
Equifax	X	-	X	-
TRW	X	-	-	-
Reuters	-	X	-	-
ADP	-	X	-	-
McGraw-Hill	-	X	X	X
Dow Jones (Telerate)	-	X	-	X
Mead Data Central	-	-	X	-
CompuServe	-	-	-	X
Knight-Ridder (Dialog)	-	X	-	X

Leading Vendors of Electronic Information Services

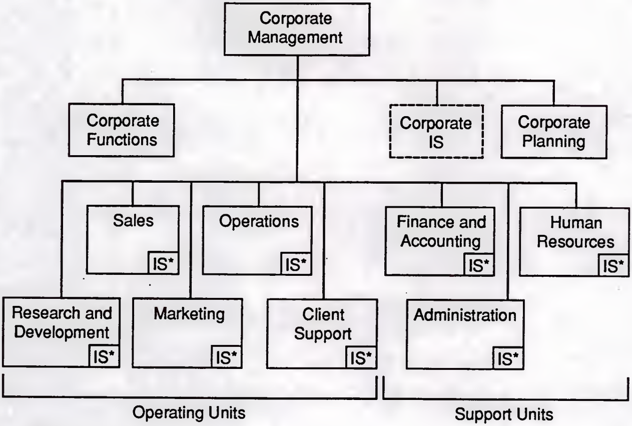
Vendor	Market Share (Percent)
TRW	10
Dun & Bradstreet	9
Dow Jones	7
Mead Data Central	6
Equifax	6
Reuters	6
McGraw-Hill	5
Knight-Ridder/Dialog	3
ADP	2

IT Trends



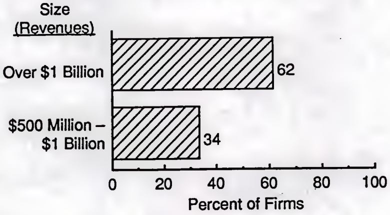
Operations
Centralized
Applications
Decentralized
1960
1980
2000

Future Organizational Position of IS Unit

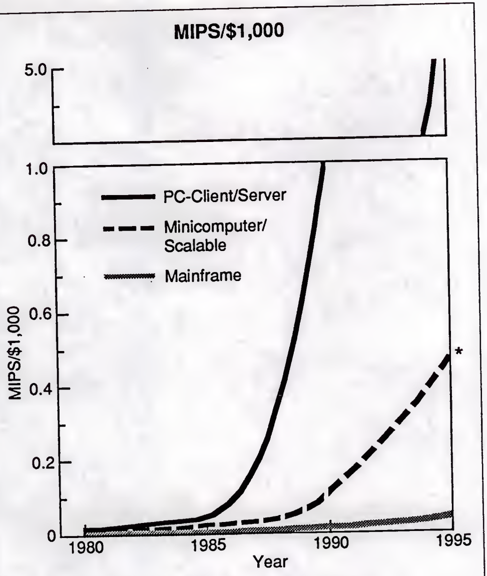


*Dotted line connections to corporate IS

User Departments with More Applications Decision Making Than IS



Source: Interviews with 67 IS departments

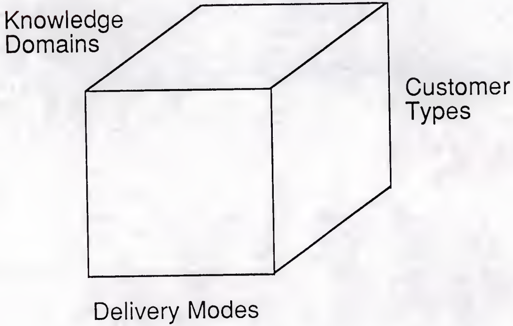


*Includes scalable processors, e.g:, NCR 3000 series.

SI ISSUES

- Buyers
  - Core business
  - End user/functional
  - Need skills/knowledge
- Vendors
  - Repeatable solutions
  - Full service
  - Competition versus alliances

Segmentation


Knowledge Domains

Customer Types

Delivery Modes

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KNOWLEDGE DOMAINS

- **Applications, e.g., security trading systems, CAD/CAM, billing systems**
- **Technical, e.g., UNIX, networking, relational DBMS**
- **Composite, e.g., imaging, transaction processing, computer security**

TECHNOLOGY CAPABILITIES

- These technologies are primarily horizontal, or cross-industry, in nature; they are functional capabilities that are usually adapted to the need of a particular application or customer)
- "Capabilities" may be in the form of products (hardware, software); services (e.g., communications); operations/maintenance skills; skill sets (design, implementation, etc.)
- This list is illustrative, not exhaustive; many of the capabilities overlap

Broadband Communications

CAD

Client/Server Data Bases

Customer Information Systems

Communications Management (Complex)

Communications Security

Document/Image Processing

Expert Systems/AI

Geographic Information Systems

Groupware

LAN/Client Server

Mobile/Wireless Communications/Computing

Multimedia Messaging/Interactive Communications

Multimedia Systems/Applications

Parallel Processing

PDAs

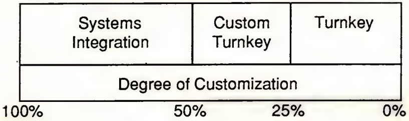
Recognition/ID Technology

Reusable/Object-Oriented Software

Software Engineering (Primarily Client/Server)

Workflow Software/Systems

The Customization Spectrum



Differences Between System Integrators and Turnkey System Vendors

Systems Integrators	Turnkey Systems
Strategic design & consulting	Tactical consulting
Multi-year effort	Single year time span
High level complexity	Modest complexity

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Notes

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Differences Between System Integrators and Turnkey System Vendors

Systems Integrators	Turnkey Systems
SW development	Software products
High cost	Moderate cost
Large project management skills	

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2/4/91

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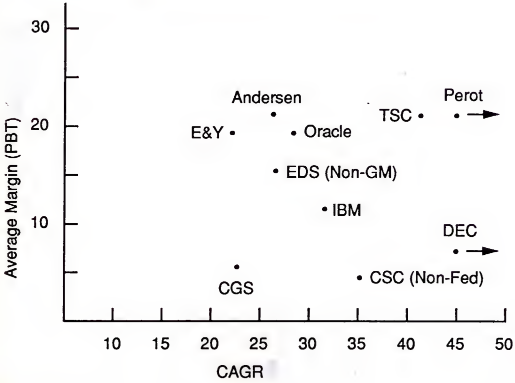
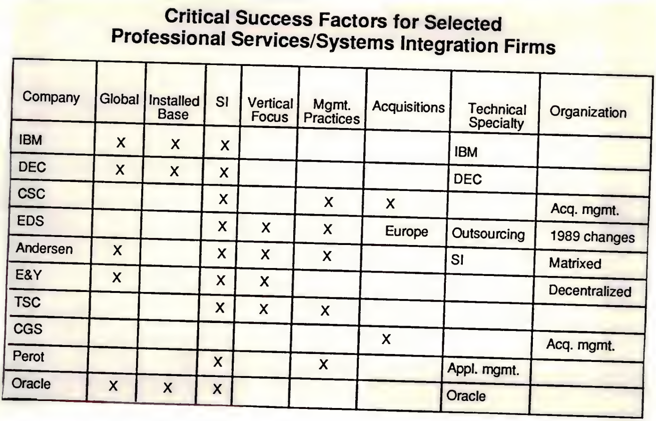
Professional Services/Systems Integration Firms Average Margins versus Growth Rates





Critical Success Factors for Selected Professional Services/Systems Integration Firms

Company	Global	Installed Base	SI	Vertical Focus	Mgmt. Practices	Acquisitions	Technical Specialty	Organization
IBM	X	X	X				IBM	
DEC	X	X	X				DEC	
CSC			X		X	X		Acq. mgmt.
EDS			X	X	X	Europe	Outsourcing	1989 changes
Andersen	X		X	X	X		SI	Matrixed
E&Y	X		X	X				Decentralized
TSC			X	X	X			
CGS						X		Acq. mgmt.
Perot			X		X		Appl. mgmt.	
Oracle	X	X	X				Oracle	

Why do SI Firms Partner ?

- Win contracts
- Fill real/perceived gaps in expertise
  - Vertical Market
  - Applications
  - Technology
- Secure access to critical technology, especially software.
- Improve efficiency (i.e., install products factor, better, cheaper)
- Reduce product costs

Partnering

- "Loose" relationships/many Partners
    - Ad hoc, opportunistic
    - Suppliers of specialized products and services to large SI firms
- "Tight" relationships/fewer partners
    - Ongoing relationships
    - Complementary strengths, e.g., client access and specialized skills

Advantages/Disadvantages of "Tight" Partnering

Advantages

- Should be included in many more opportunities
- More chance to learn and add value
- May become prime contractor

Disadvantages

- Dependent on firm over which there is little control
- Partners' objectives may change
- If subcontractor, may not attain high margins

Advantages/Disadvantages of "Loose" Partnering

Advantages

- Small investment
- Less risk
- Less dependence
- Wider opportunities to learn

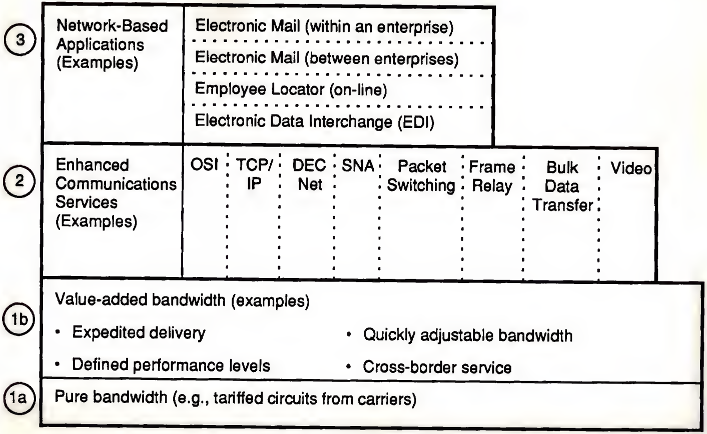
Disadvantages

- May become commodity supplier
- Support resources may be stretched
- Low visibility
- Less chance to add value

Partner Alternatives

Technical Skills	Applications Knowledge: Low	Applications Knowledge: High
High	Aerospace	Opportunities Partner (e.g., Andersen, Arthur D. Little)
Low	Body Shop Partner (e.g., CTG)	Complementary Partner (e.g., 5 of “Big 6”)

Levels of Communication Services



③ Network-Based Applications (Examples)

- Electronic Mail (within an enterprise)
- Electronic Mail (between enterprises)
- Employee Locator (on-line)
- Electronic Data Interchange (EDI)

② Enhanced Communications Services (Examples)

- OSI
- TCP/IP
- DEC Net
- SNA
- Packet Switching
- Frame Relay
- Bulk Data Transfer
- Video

(1b) Value-added bandwidth (examples)

- Expedited delivery
- Defined performance levels
- Quickly adjustable bandwidth
- Cross-border service

(1a) Pure bandwidth (e.g., tariffed circuits from carriers)

Anticipated Developments and Opportunities

- Digital cellular subsidies
- More granular cellular pricing
- Bypass to evade LEC "tax"
- Substitute communications for rent
- "Software agents" and gateway utilities
- Seamless E-mail

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New Capacity from Several Sources

- Analog → Digital cellular
- Cellular Digital Packet Data (CDPD)
- Specialized Mobile Radio (SMR) service
- Personal Communications Service (PCS)
- One- and two-way nationwide wireless networks

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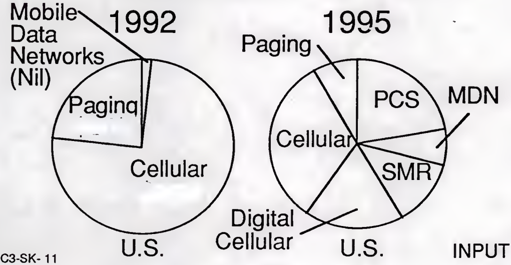
Increased Airwave Capacity Is Coming Worldwide



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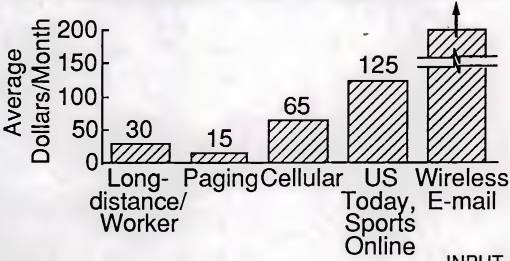
Untethered Communication Commands a Price Multiple (U.S.)



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Interactive Home Media Products—The $0 B Business

- 500 Channels
- Information Highway
- Global Village
- "Cyberspace"

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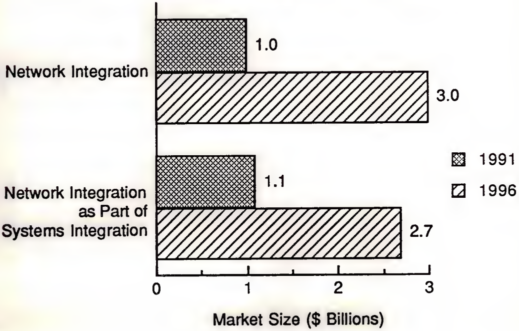
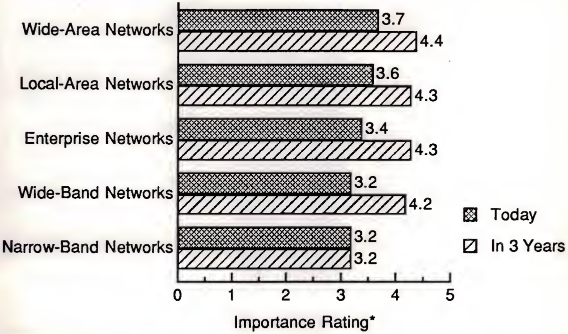
"Alliance Shock"

- Bell Atlantic - TCI
- BT - MCI
- McGraw - AT&T
- Paramount - Viacom
- Time Warner - Silicon Graphics
- Time Warner - Scientific Atlanta
- TCI and Time Warner
- CableSoft
- AT&T - Eo/Go

Commercial Network Integration Expenditures
1991-1996

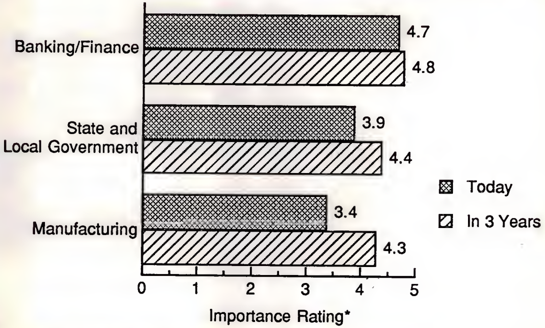


Variety of Network Types



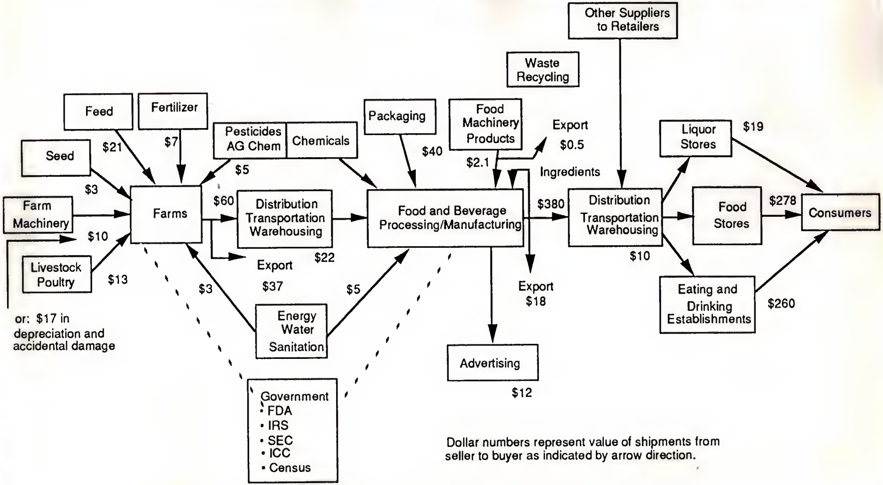
*On a scale of 0-5; where 0=no importance, 5=greatest importance.

Importance of Network Integration as a Technology



*On a scale of 0-5; where 0=no importance, 5=greatest importance.

Grocery Trading Community: Players and Trade Flows
($ Billions)



Dollar numbers represent value of shipments from seller to buyer as indicated by arrow direction.

The Impact of Multimedia on Client/Server Computing

- Market Definition
- Market Segmentation
- Market Size Estimates
- Multimedia Impact on Network Delivery
- Market Players
- Conclusions

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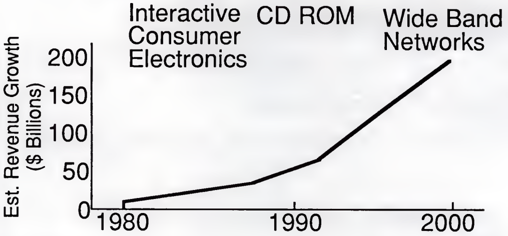
The Emerging Multimedia Industry



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1993 U.S. Multimedia Market Estimates

Market	Market Size ($ Billions)
Corporate applications	1
Games/consumer applications	6

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Participating Companies

- Delivery channels
- Enabling technologies
- Content providers
- Applications providers

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Market Collisions

- Computer and games
- Network services and cable companies
- Content providers and technology channel deliverers

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Market Segment: "Info-tainment"

- Market size
- Market transitions
- Alliances

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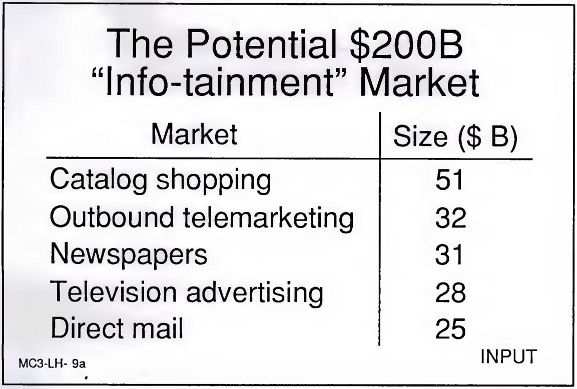

The Potential $200B "Info-tainment" Market

Market	Size ($ B)
Catalog shopping	51
Outbound telemarketing	32
Newspapers	31
Television advertising	28
Direct mail	25

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The Potential $200B "Info-tainment" Market

Market	Size ($ B)
Home video rentals	11
Magazines	10
Yellow Pages	10
Radio	9
Information services	9

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The Potential $200B "Info-tainment" Market

Market	Size ($ B)
Records/tapes/CDs	8
Theater	5
Video games	4

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Categories of Consumer Software

- Entertainment
- Information
- Transaction
- Education
- Communication

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Consumer Computer Software

- Projected 20% growth rate
- Units comprise one-third of shipments
- Changing delivery channels
- Increasing computer literacy
- Games applications rule market

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Enabling Technologies

- Object-oriented database technology
- Authoring tools
- Advances in processing and compression
- Advances in storage
- Knowlege-based access tools

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Multimedia on Client/Server Networks

- New competitive order
- Computing shift opportunity
- Delivery to the user-“consumer software”
- Desktop access to all computing resources

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Distributed Computing Framework

<table>
<tr><td>Mgmt. Apps.</td><td>Tools</td><td>Apps.</td><td rowspan="6">O.S. Service</td></tr>
<tr><td rowspan="2">Mgmt. Svcs.</td><td colspan="2">Application Services</td></tr>
<tr><td>Data</td><td>Presentation</td></tr>
<tr><td colspan="3">Network Application Support</td></tr>
<tr><td colspan="3">Transport Network</td></tr>
<tr><td colspan="3">Internetwork</td></tr>
</table>

INPUT

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INPUT

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CONTACT REPORT

Contact Date: / /

INPUT Staff: Init. ______ Init. ______ ☐ INPUT office ☐ Client Office ☐ Other ______ Date Written: / /

Company TRW

Name Steve Patay

Title

Address

Phone: (310) 812-9603

Fax: ( ) -

DISTRIBUTION: Prog./Proj. ID ______

Action	Info.	By When	Describe Action-F/U
			Call

Tech Symposium 20/21 Linda

21 people 20 min ea/ to confirm

Tech / Cap

Outside Sat in or *Dave Barahot

~~7147~~

0817

Eg -
- Auto ID
- EDI X.400
- CASE
- C/S
- OA
- IS Tran
- Geog Info Sy
- Multi media Multi-media
- Ad ~~reog~~ recog tech
- Telecom Svcs
- Hi- Tran plus
- Hyp ATM swch
- Mass storg
- Hi-bandwidth data trans

☐ Continued over

M&S 300/01 6/92 (R)

Mail List Change Order **1.** ☐ Update ☐ Correction ☐ Deletion ☐ Addition* Serial Number____________

2. Customer Type: ☐ Vendor ☐ Others ☐ Media ☐ User

3. Newsletters: ☐ EDI ☐ Field Service ☐ Other

4. Vendor: Vendor Type— ☐ Client ☐ Former/Report Client ☐ Prospect

- Contact Level— ☐ Executive ☐ Acquisition ☐ International ☐ Other
- If Exec. or Other Contact Level— ☐ Maintenance ☐ Equipment ☐ Communications ☐ Others ☐ Info. Svc.
- If Info. Services— ☐ Turnkey & Software ☐ Network & Processing ☐ Systems Integration ☐ Professional Svc.

5. If User: User Type— ☐ Client ☐ Former/Report Client ☐ Prospect

- Comm. Contact Level— ☐ Executive ☐ IS Mgmt. ☐ Other
- Fed. Contact Level— ☐ Executive ☐ Acquisition ☐ Prog. ☐ Manager/Technical ☐ Other
- If Fed. Executive— ☐ Info. Resource Mgr. ☐ Asst. Secretary ☐ Commander (Military) ☐ Agency Head
- If Fed. Other— ☐ Laboratory ☐ NIS ☐ Users ☐ GSA

* No names will be added without a completed change order and program manager approval.

Program Manager Authorization ____________

CONTACT REPORT
Continuation

Company ____________

Name ____________

M&S 310 11/90

INPUT

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CONTACT REPORT

Contact Date: 10, 29, 93

INPUT Staff: Init. AJC Init. ______ ☑ INPUT office ☐ Client Office ☐ Other ______ Date Written: 10 / 29 / 93

Company TRW

Name STEVE PATAY

Title

Address

Phone: (310) 812 - 9603.

Fax: ( ) -

DISTRIBUTION: Prog./Proj. ID ______

Action	Info.	By When	Describe Action-F/U
Bob -	Please	Call	with info.
	Tom	fyi	
Lola	Call	Falatico	

· Wanted to know what we thought of:

A. Consumer Credit Information Market. This is in our EIS/Network Services segment. They think it is about $1B Want to know how big we think it is and what is growth rate.

B. ~~tot~~ Direct Mail Market. Someone said it is $25 BILLION market and accessible part is $5B. I told them we included processing for Direct Mail in Batch services: but not when it was integrated with direct marketing services. It would then be in the marketing industry not the inf.svcs. industry. I suggested that if you took the total no. of pieces mailed in U.S. and multiplied by cost of providing a name would give the ~~total~~ addressable data base/processing side of the direct mail market. Of course most companies do this business in-house.

~~C.~~ We also discussed their discussion with CGS (This is highly confidential). CGS is looking for a U.S. partner, especially in SI. Are talking to TRW - meeting planned in Chicago. They had worked with Hoskyns on a bid for British Gas that fell through. Also TFS has number of international bids pending - CGS trying to work with them. Steve said Phil Falatico is key on this.

☐ Continued over

M&S 300/01 6/92 (R)

Mail List Change Order 1. ☐ Update ☐ Correction ☐ Deletion ☐ Addition* Serial Number____________

2. **Customer Type:** ☐ Vendor ☐ Others ☐ Media ☐ User

3. **Newsletters:** ☐ EDI ☐ Field Service ☐ Other

4. **Vendor:** Vendor Type— ☐ Client ☐ Former/Report Client ☐ Prospect
   - Contact Level— ☐ Executive ☐ Acquisition ☐ International ☐ Other
   - If Exec. or Other Contact Level— ☐ Maintenance ☐ Equipment ☐ Communications ☐ Others ☐ Info. Svc.
   - If Info. Services— ☐ Turnkey & Software ☐ Network & Processing ☐ Systems Integration ☐ Professional Svc.

5. **If User:** User Type— ☐ Client ☐ Former/Report Client ☐ Prospect
   - Comm. Contact Level— ☐ Executive ☐ IS Mgmt. ☐ Other
   - Fed. Contact Level— ☐ Executive ☐ Acquisition ☐ Prog. ☐ Manager/Technical ☐ Other
   - If Fed. Executive— ☐ Info. Resource Mgr. ☐ Asst. Secretary ☐ Commander (Military) ☐ Agency Head
   - If Fed. Other— ☐ Laboratory ☐ NIS ☐ Users ☐ GSA

* No names will be added without a completed change order and program manager approval.

Program Manager Authorization ____________________

CONTACT REPORT
Continuation

Company ____________________

Name ____________________

Steve likely to be head of larger unit – double in size.

M&S 310 11/90

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CONTACT REPORT

INPUT Staff: Init. MK Init. ______ ☑ INPUT office ☐ Client Office ☐ Other ______

Contact Date: 10/1 93

Date Written: 10 6 93

Company TRW

Name Phil Palaccia

Title V.P. of SIG

Address

Phone: ( ) -

Fax: ( ) -

DISTRIBUTION: Prog./Proj. ID ______

Action	Info.	By When	Describe Action-F/U
	Tom		

· Arranged meeting for 10/6.

· Each Standard, president, interested in IT market
– particularly for TM systems & services.

· Making an investment is possibility.

Have full time study team to look at all the pieces.
Phase 1 end of November – What is mkt? Do they have an opportunity
2 after that is implementation

· Phil is familiar with us: bought world wide info to look at Europe several years ago.
familiar with CSC

Note: customer services unit of ISG was once valued at over $120 m. eventually sold to Computerland for $20m.
Also they had opportunity to buy CSC at one point.

☐ Continued over

M&S 300/01 6/92 (R)

Pink

ORDER/INVOICE/FULFILLMENT

Acctg. ONLY

Inv. Comp.	By:	Date:	Client #	Order #	Inv. #	Multi-Invoicing ____ of ____

CUSTOMER/INVOICE TO

ORIGINATOR (Signature) JK DATE 10/15/93

Company TRW
Name Mr./Ms. Steve Patay
Position VP
Address One Space Park
City Redondo Beach
Province
Phone 310 812 9603

CA Tax Rate
CT Tax 8%
Salutation
State CA
Zip 90278
Country
Fax 310 813 2412
Tlx

APPROVALS
VP Sales/Res.
Date
Controller
Date

Special instructions for invoicing, progress billing, or delayed payments, etc.
Bill end of Oct (will notify)

ORDER

Contract Year Beg. ____
End ____

☐ New Order (N1) ☐ Prior Yr (N3)
☐ Renewal (N2) ☐ Cancel

Invoice Type
☐ Fulfillment Only
☐ W/Order (OR)
☐ Monthly (MO)
☐ Quarterly (QT)
☐ Pending

Employee # Sold by:
____ ___%
____ ___%
____ ___%

Employee # Commission to:
____ ___%
____ ___%
____ ___%

CLIENT AUTH.

PO# ____
INPUT Contract ☐ Letter ☐ Verbal ☒
Attach all authorizing documents to white (contract) copy. See att

SHIP TO

Company
Name Mr./Ms.
Position Same
Address
City
Province
Salutation
State
Zip
Country
Phone

ITEM TYPE

- Subscription (SB)
- Custom (YC/ZC/KC)VC
- Multiclient (MC)
- Reports (RP)
- Copies (CP)
- Consult/Present (PR)
- Newsletter (NL)
- Reimbursed Costs (EX)
- Merger/Acq. (ME)
- Exec Overview (EO)
- Conf/Seminar (CN)

DETAIL

Indicate US, UK, FR, VA	Prod. ID/Year	Item Type Code	Item Description or Title	Quantity	Price	Shipped By	Date
US	YTR	YC	Parts of 10/13		11,500		
			proposal				
			A + part of				
			B				
			+ expenses				
			(Presentations)				

Fulfillment to be completed in: ☐ Corporate ☐ London ☐ Virginia ☐ France ☐ Other ____

• White - Contract • Green - Fulfillment • Yellow - Invoice • Pink - Originator • Goldenrod - Sales Manager

M&S180 12/9

INPUT

INPUT

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October 14, 1993

To: Steve Patay, TRW

Fm: Tom O'Flaherty, INPUT

Sub: Symposium on TRW Capabilities

(1) This will confirm my conversation with you and Linda today and yesterday that I will be able to attend. However, due to prior commitments, I will not be able to arrive at Building E-2 until approximately 11 am Wednesday, October 20; I will be available until the completion of the meeting the next day.

(2) The fee for this attendance will be $3,500 if charged for separately. There would be no charge if Task "B" in INPUT's proposal of October 13 is authorized.

(3) The attached form is what I will use myself to "rate" each capability. If there is time and you feel it is appropriate, it would be useful if each presenter would explicitly address the three questions in their presentations (i.e, current and potential positioning and thoughts on the market opportunity).

As noted on the form, I would expect the presenters to have a fairly good idea how their capability compared to other sources. I would not necessarily expect them to have a very good idea on market acceptability (i.e, A2 may be better than B2 if time to market is important; "can't rates" are generally either very attractive or very unattractive; etc.)

I would also appreciate your sending me an agenda or other materials on the symposium.

VI. FEE

The professional fee for the study will be $72,000. One-half of this fee ($36,000) is due and payable upon authorization. The remainder of the professional fee plus out-of-pocket expenses is due upon the submission of the final report or presentation. Out-of-pocket expenses primarily include travel, telephone, and report preparation will be charged at cost.

At TRW's request, the work has been further broken out into four functional units and the professional fee priced accordingly. The sum of the individual units is more than the professional fee for the entire project because of efficiencies when the project is planned and perform simultaneously. Because of the fast track nature of the assignment, INPUT does not believe that it is practical to perform functional units of work sequentially.

Function Unit of Work		Associated Professional Fee
A.	Market overview preparation and presentation	[✓ $8,000]
B.	Analysis of internal capabilities and expansion to adjacent markets	$21,000
C.	In-depth competitive analysis of eight competitors	$25,000
D.	Scenario analysis and final report	$25,000

Note: If "D" is elected without "B" or "C", INPUT may choose to further define the areas of "Scope" which it will be responsible for.

The above figures are for the professional fee only. Reasonable documented out-of-pocket expenses will be charged for work in each functional unit.

TRW may authorize the study by signing below.

PROJECT SCHEDULE

Week

Activity	Name	Act. Days	Factor	ESD	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Init. Pres	TCP BG																	
Prep				1	5	x1.6	=	8										
Pres	TCP BG			2½ 1½														
An of Int Cap/											8							
Exp to adj																		
mktr					10+	3	=	13x	1.6	=	21							
Comp Prblm					16	+3		19x	1.6		30							
8 x 2																		
Scenarios/				16	[illegible] +	2		18x	1.6		29							
final rpt										0	88							
					47 +	3	=	~~49~~x	1.6=	80								
TOTAL PLAN SR.	▨		▨	▨			50											
TOTAL PLAN RA	▨		▨	▨														
TOTAL PLAN ESDs	▨	▨	▨															

Proj. Code: ______________ Proj. Name: ______________ Prepared by: ______________

Proj. Manager: ______________ Date: ______________

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Steve Patay

310-764-6553

Meth — Size
Growth

Forecast

IT "hose job"

Del Model
Ind Groups

→ emph: SI
PFS
Outs?
Netw?

Industry Markets

Approximately ___% of DH&S' 1989 revenue was derived from the manufacturing industry, ___% from the health care industry, ___% from the financial services industry, ___% from public utilities, ___% from federal,state, and local government , and ___% from real estate segment.

Geographic Markets

Approximately ___% of DH&S' 1989 revenue was derived from the U.S., ___% from Canada, ___% from Europe, and ___% from other international sources.

DH&S provides information services through the following offices throughout the U.S.:

____

____

____

______________.

DH&S international information services are provided out of the following foreign offices:

____

____

____

______________.

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PROJECT WORK STATEMENT

TITLE SI Opportunities/Presentation

CLIENT TRW

CONTRACT: ATTACHED ____ TO FOLLOW ____ LETTER ____ VERBAL ____

PROJECT LEADER TU PROJECT CODE ____

DATE STARTED 10/14 PLANNED COMPLETION DATE 10/28

LEVEL OF EFFORT(Professional Man Days) 7

TOTAL CONTRACT VALUE: $ or £ $11,500

REVENUE DISTRIBUTION (% or $) INPUT US 100 INPUT LTD ____

REIMBURSABLE EXPENSES: NO ____

YES ✓

EXP. BUDGET ✓

TO COVER:

TRAV: ✓

TELE: ✓

RPT. PREP.: ____

OTHER: ____

BILLING SCHEDULE DESCRIPTION Bill at end

PROJECT DESCRIPTION

- Assess Tech opportunities
- Give SI presentation

INDICATE TYPE OF WORK: REPORT ____ PRESENTATION ✓

THANK YOU PACKAGE: YES ____ NO ✓

ACCOUNTING USE ONLY: ENTERED ON CURRENT PROJECT LIST ____

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CONTRACT FILE

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PROJECT SCHEDULE

YTR

Week

Activity	Name	Act. Days	Factor	ESD	10/15 1	10/22 2	3	4	5	6	7	8	9	10	11	12	13	14
Prepare					1													
Present					3	3												
TOTAL PLAN SR.	▨		▨	▨														
TOTAL PLAN RA	▨		▨	▨														
TOTAL PLAN ESDs	▨	▨	▨															

Proj. Code: ______ Proj. Name: TRW

Prepared by: TR

Page 1 of

Proj. Manager: ______ Date: 10/15

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FAX TRANSMITTAL FORM

Date: Nov 4

To: Name: Ron Sugar

Tel./Location: TRW

Co.:

Fax No: 310 813-2412

From: Tom O'Flaherty

Subject: Technology Assessment

Confidential: Y / N

Urgent: [✓ Y] / N

Page: 1 of 11

File: Chron

Contact

Other:

Ⓟ
Project file
YTR
11/93

PRELIMINARY ASSESSMENT OF TRW TECHNOLOGY

I. BACKGROUND

INPUT attended TRW's technology overview presentation on October 21 and 23, 1993 where 21 presentations were made on technology capabilities.

This report summarizes INPUT's initial assessments of these technologies. INPUT's assessments are based on the following:

- Statements, data and analysis presented by TRW.
- Prior research conducted by INPUT in these product and market areas
- INPUT staff knowledge in these technology and market areas

Each technology area was evaluated against the factors described in section II the results of the assessments are shown in the attached series of exhibits.

The evaluations were based on INPUT's current understanding. In some cases, INPUT would require additional information for a complete assessment (these are noted by "?" in the appropriate cell). However, in most cases INPUT has had enough information to provide at least a preliminary assessment.

II. ASSESSMENT CRITERIA

The following factors were used to assess the technologies presented. These assessments are all necessarily tentative and include many implicit assumptions. More complete assessments would be dependent on

- A deeper understanding of the offerings along with other supporting or associated technologies.
- In some cases, additional market research.

Overall Technolgy

Each technology has been classified into one of the following categories:

- General capability, i.e., the technology capability is a general one that does not appear to give TRW a competitive advantage.
- Leading edge, i.e., TRW appears to be among the leaders
- Unique, i.e., TRW appears to have a unique position

Market Issues

Market issues are important determinants as to the likely success of an offering. The pertinent market issues are

- How significant is the commercial opportunity? This assessment represents a combination of market size, growth and the competitive environment. This is a broad-brush assessment and will have to further quantified and analyzed.
- Is there a critical time window?
- What is the relative level of ongoing investment, either to complete the offer and/or to retain the technological position. This ranges from a "low" level of investment ($100,000 or less), to "very high", in the tens of millions or more.
- What is the relative level of risk? Risk is a combination of technical risk (Will the offeering work?} and market risk (Will there be enough buyers?)
- Are there significant TRW resource constraints? If there are resource constraints, these are generally a limited number of skilled people available.

Note: Assessments are either yes/no or low (L), low/medium (L/M), medium (M), medium/high (M/H), high (H) or very high (VH). These assessments are judgmental and can later be refined and quantified if additional information becomes available and additional analysis is performed. However, INPUT believes that these assessments represent a useful point of departure for more in-depth analysis.

Delivery Alternatives

Based on the discussions at the presentation, the technologies can be delivered as

- A service (e.g., Odyssey)
- Know-how (i.e, via consulting)
- One or more products (as in text management)
- Systems integration (or as a component of SI)

Delivering know-how is often subject to resource (people) bottlenecks. TRW is probably not well-positioned to market and service some products (e.g., software. SI-based services will usually provide the largest amount of leverage. Since many of the SI-opportunities will be in the commercial market, TRW may have to partner, at least initially, with established SI firms to be the most effective in commercial markets.

Technology

In the course of the analysis, the technologies presented were noted; these weere classified into the following categories:

- Imaging
- Identification
- Data/test management
- Communications
- Other (four technologies in whole or part)

Imaging, data/text management and communications are already complementary technologies and will, arguably, being even more closely related in the future.

It became clear that within particular technology areas that there was considerable overlap in activities. INPUT believes that at least some of the acitivities in, for example, imaging and text/data management, would benefit be being much more closely coordinated and, possibly, combined. It is not possible on the information provided to make any stronger statements now in this regard.

Linkage to Other TRW Technologies

While there was overlap between many of the technologies (e.g., across imaging), some links appear tighter than others. These are noted in the exhibit.

Factor	1. Automated ID Systems	2. EDI	3. I-CASE Meth.	4. C/S Arch.	5. Text Mgt.	6. OA	7. Automotive Info. Sys.
Overall Technology							
• General Capability		X	X	X		X	
• Leading Edge	X						X
• Unique					X		
Market Issues							
• Commercial Opportunity	M	N/A	N/A	N/A	M	L	H
• Critical Time Window	No	No	No	Yes	No	No	Yes
• Level of Ongoing Investment	?	M	M	M/H	M/H	L	H
• Level of Risk	M	N/A	N/A	N/A	M	N/A	M
• Resource Constraint	No	Yes	Yes	Yes	Yes	Yes	?
Delivery Alternatives							
• Service					X		
• Know-how		X	X	X	X		
• Product					X		X
• SI	X	X		X	X	X	X
Technology							
• Imaging	X				X	X	
• Identification	X				X	X	
• Data/Text Mgt					X	X	
• Communications		X		X		X	X
• Other			X				X
Linkage to other TRW Technologies (Presentation #)				6	6,8	5,8	8

Factor	8. Transportation Info. Sys.	9. Elec, Doc. Mgt.	10. GIS	11. Image Perspective Transformation	12. Personal Sec. Sys.
Overall Technology					
• General Capability					
• Leading Edge	X	X	X		X
• Unique				X	
Market Issues					
• Commercial Opportunity	L/M	M	M	L/M	M
• Critical Time Window	Yes	No	No	Yes ?	Yes ?
• Level of Ongoing Investment	M/H	M	M	M	M
• Level of Risk	H	M	H	M/H	M/H
• Resource Constraint	?	Yes	Yes	Yes	?
Delivery Alternatives					
• Service		X	X	X	
• Know-how	X	X	X	X	
• Product				X	
• SI	X	X	X	X	X
Technology					
• Imaging	X	X	X	X	X
• Identification		X		X	X
• Data/Text Mgt.		X	X	X	X
• Communications	X	X	X		X
• Other					
Linkage to other TRW Technologies (Presentation #)	7	5, 6	11	10	

Factor	13a. InfoSite	13b. Info Quest	14. Copernicus	15. Telecom Svcs.	16. Recognition Technology
Overall Technology					
• General Capability	X		X	X	
• Leading Edge		X			X
• Unique					
Market Issues					
• Commercial Opportunity	M	L	M?	H	H
• Critical Time Window	No	?	?	No	Yes
• Level of Ongoing Investment	L	H?	H	L	M/H
• Level of Risk	L	M	M	L	M/H
• Resource Constraint	No	Yes	No	No	Yes
Delivery Alternatives					
• Service		X		X	X
• Know-how	X	X		X	X
• Product	X		X		X
• SI	X	X		X	X
Technology					
• Imaging					X
• Identification			X		X
• Data/Text Mgt.	X	X	X		X
• Communications			X	X	X
• Other					
Linkage to other TRW Technologies (Presentation #)	9, 13b	9, 13a		N/A	14, 17

Factor	17. High Vol. 00TP	18b. TDRS Transponders, PacifiCom	19. Odyssey	20. ATM Switch
Overall Technology				
• General Capability				
• Leading Edge	X	X		X
• Unique			X	
Market Issues				
• Commercial Opportunity	M/H	M	L?	M
• Critical Time Window	No	Yes	Yes	Yes
• Level of Ongoing Investment	M	H?	VH	H
• Level of Risk	M	H	H	H
• Resource Constraint	Yes	Yes	Yes	?
Delivery Alternatives				
• Service	X	X	X	
• Know-how	X			X
• Product				X
• SI	X			
Technology				
• Imaging	X			
• Identification	X			
• Data/Text Mgt.	X			
• Communications	X	X	X	X
• Other				
Linkage to other TRW Technologies (Presentation #)	16	19	18b	

Factor	21b. Superconducting Electronics	21a. Ramcube
Overall Technology		
• General Capability		
• Leading Edge	X?	X
• Unique		
Market Issues		
• Commercial Opportunity	L	M
• Critical Time Window	Yes?	Yes
• Level of Ongoing Investment	?	L
• Level of Risk	H?	H
• Resource Constraint	Yes?	No
Delivery Alternatives		
• Service		
• Know-how	X	
• Product	?	X
• SI	?	
Technology		
• Imaging		
• Identification		
• Data/Text Mgt.		
• Communications	X	
• Other	X	X
Linkage to other TRW Technologies (Presentation #)		